E 3510-22-P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

[RTID 0648-XB988]

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Pile Driving Training Exercises at Naval Base Ventura County, Port Hueneme

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice; proposed incidental harassment authorization; request for comments on proposed authorization and possible renewal.

SUMMARY: NMFS has received a request from the United States Navy (Navy) for authorization to take marine mammals incidental to pile driving training exercises at Naval Base Ventura County, Port Hueneme (NBVC). Pursuant to the Marine Mammal Protection Act (MMPA), NMFS is requesting comments on its proposal to issue an incidental harassment authorization (IHA) to incidentally take marine mammals during the specified activities. NMFS is also requesting comments on a possible one-time, 1 year renewal that could be issued under certain circumstances and if all requirements are met, as described in **Request for Public Comments** at the end of this notice. NMFS will consider public comments prior to making any final decision on the issuance of the requested MMPA authorization and agency responses will be summarized in the final notice of our decision. The Navy's activities are considered (a) military readiness activities pursuant to the MMPA, as amended by the National Defense Authorization Act for Fiscal Year 2004 (2004 NDAA).

DATES: Comments and information must be received no later than **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

ADDRESSES: Comments should be addressed to Jolie Harrison, Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service and should be submitted via email to *ITP.tyson.moore@noaa.gov*.

Instructions: NMFS is not responsible for comments sent by any other method, to any other address or individual, or received after the end of the comment period. Comments, including all attachments, must not exceed a 25-megabyte file size. All comments received are a part of the public record and will generally be posted online at *www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-military-readiness-activities* without change. All personal identifying information (*e.g.*, name, address) voluntarily submitted by the commenter may be publicly accessible. Do not submit confidential business information or otherwise sensitive or protected information.

FOR FURTHER INFORMATION CONTACT: Reny Tyson Moore, Office of Protected Resources, NMFS, (301) 427-8401. Electronic copies of the application and supporting documents, as well as a list of the references cited in this document, may be obtained online at: *www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-military-readiness-activities*. In case of problems accessing these documents, please call the contact listed above.

SUPPLEMENTARY INFORMATION:

Background

The MMPA prohibits the "take" of marine mammals, with certain exceptions. Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq*.) direct the Secretary of Commerce (as delegated to NMFS) to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and either regulations are proposed or, if the taking is limited to harassment, a notice of a proposed incidental harassment authorization is provided to the public for review.

Authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s) and will not have an unmitigable adverse impact on the availability of the species or stock(s) for taking for subsistence uses (where relevant). Further, NMFS must prescribe the permissible methods of taking and other “means of effecting the least practicable adverse impact” on the affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of the species or stocks for taking for certain subsistence uses (referred to in shorthand as “mitigation”); and requirements pertaining to the mitigation, monitoring and reporting of the takings are set forth.

The 2004 NDAA (Pub. L. 108–136) removed the “small numbers” and “specified geographical region” limitations indicated above and amended the definition of “harassment” as applied to a “military readiness activity.” The NDAA also amended the process as it relates to military readiness activities and the incidental take authorization process such that “least practicable impact” on such species or stock shall include consideration of personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity. Before making the required determination, the Secretary shall consult with the Department of Defense regarding personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity. The activity for which incidental take of marine mammals is being requested addressed here qualifies as a military readiness activity. The definitions of all applicable MMPA statutory terms cited above are included in the relevant sections below.

National Environmental Policy Act

To comply with the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 *et seq*.) and NOAA Administrative Order (NAO) 216-6A, NMFS must review our proposed action (*i.e.*, the issuance of an IHA) with respect to potential impacts on the human environment. This action is consistent with categories of activities identified in Categorical Exclusion B4 (IHAs with no anticipated serious injury or mortality) of the Companion Manual for NOAA Administrative Order 216-6A, which do not individually or cumulatively have the potential for significant impacts on the quality of the human environment and for which we have not identified any extraordinary circumstances that would preclude this categorical exclusion. Accordingly, NMFS has preliminarily determined that the issuance of the proposed IHA qualifies to be categorically excluded from further NEPA review.

We will review all comments submitted in response to this notice prior to concluding our NEPA process or making a final decision on the IHA request.

Summary of Request

NMFS received a request from the U.S. Navy on August 18, 2021, for an IHA to take marine mammals incidental to pile driving training exercises at NBVC. NMFS provided comments on the application and the Navy resubmitted a revised application on May 11, 2022. On May 25, 2022, the Navy notified NMFS of the need to update the application to include additional activities. NMFS received the updated application on October 26, 2022. NMFS provided comments on the updated application and received a revised application from the Navy on December 5, 2022. NMFS provided additional comments on the application on December 8, 2022, and received an update application on January 6, 2023, which was deemed adequate and complete on January 12, 2023. The Navy's request is for take of California sea lions (*Zalophus californius*) and harbor seals (*Phoca vitulina richardii*) by Level B harassment only. Neither the Navy nor NMFS expect serious injury or mortality to result from this activity and, therefore, an IHA is appropriate.

Description of Proposed Activity

Overview

The primary mission of NBVC is to provide a home port and to furnish training, administrative, and logistical support for the Naval Construction Battalions. Naval Construction Group ONE (NCG-1) is proposing to execute pile driving training exercises at NBVC that are essential to construction battalion personnel prior to deployment. The proposed work would include vibratory and impact pile driving, temporary pier construction, and subsequent removal of all installed materials. Training would occur at either Wharf 4 or Wharf D. These are military readiness activities, as defined under the National 7 Defense Authorization Act (NDAA) of Fiscal Year 2004 (Public Law (Pub. L.) 108-136).

Up to four training exercises would take place during the proposed authorization period. Each training exercise would last up to 24 days and would include pile installation and removal of a sheet pile wall and round pile pier. The sheet pile wall and pier construction/removal would occur during the same training evolution, but would not occur at the same time. The U.S. Navy is requesting an IHA for Level B harassment of California sea lions and harbor seals related to these activities. Level A harassment is not anticipated or requested. The IHA would be valid for one year after issuance.

Dates and Duration

The total annual days of active in-water pile installation and removal would be 96 days. These days would be spread over four annual training exercises, each of which would include 12 days for in-water pile installation and 12 days for in-water pile removal (*i.e.*, each training exercise would last 24 days). Each workday would occur during daylight hours, and would last approximately eight hours, but pile driving/removal would not occur for the entire eight hours. Due to the availability of resources, requirements by NBVC for port use, and battalion training needs, it is not possible to predict the precise dates of training activities; however, no more than four separate training events would occur over the duration of the proposed 1 year IHA.

Geographic Region

Port Hueneme is located approximately 102 kilometers (km) (55 nautical miles) northeast of Los Angeles. The port is adjacent to the Santa Barbara Channel, between the California coast and the offshore Channel Islands. Port Hueneme does not fall within the Study Area for any other Navy at-sea Environmental Impact Statements/Overseas Environmental Impact Statements in the region, as it is also north of the Navy's Hawaii-Southern California Training and Testing (HSTT) Study Area, and east of the Navy's Point Mugu Sea Range Study Area.

Port Hueneme Harbor encompasses NBVC Port Hueneme and a commercial port. The entrance channel is 2,300 ft (701 m) long with the narrowest width of the channel entrance at 330 ft (101 m). The average depth of the harbor is 34.5 ft (10.5 m) at Mean Lower Low Water. Port operations comprise approximately 200 acres at the southern end of NBVC Port Hueneme. The substrate is primarily mud, with occasional rock debris at the base of the inlet jetties. Marine subtidal habitat at NBVC Port Hueneme consists of communities associated with sand, mud, and rock substrates. Shoreline features in the harbor around Wharf 4 and Wharf D include riprap, quay walls, and wharf pilings.

Each training event would occur at either Wharf 4 or Wharf D at NBVC. Wharf 4 contains two potential pile driving sites. The Wharf 4 South site is located directly in front of the Naval Facilities Engineering and Expeditionary Warfare Center Dive Locker, while the Wharf 4 East site is located along the side of the Naval Facilities Engineering and Expeditionary Warfare Center Dive Locker (Figure 1). The Wharf D site is located near the mouth of the harbor (Figure 2). The Wharf 4 locations are open to the majority of the harbor, whereas the Wharf D location is almost entirely self-contained, with only one access point from the channel leading to the harbor itself. No part of the proposed training exercises would occur outside of Port Hueneme Harbor in the Pacific Ocean.

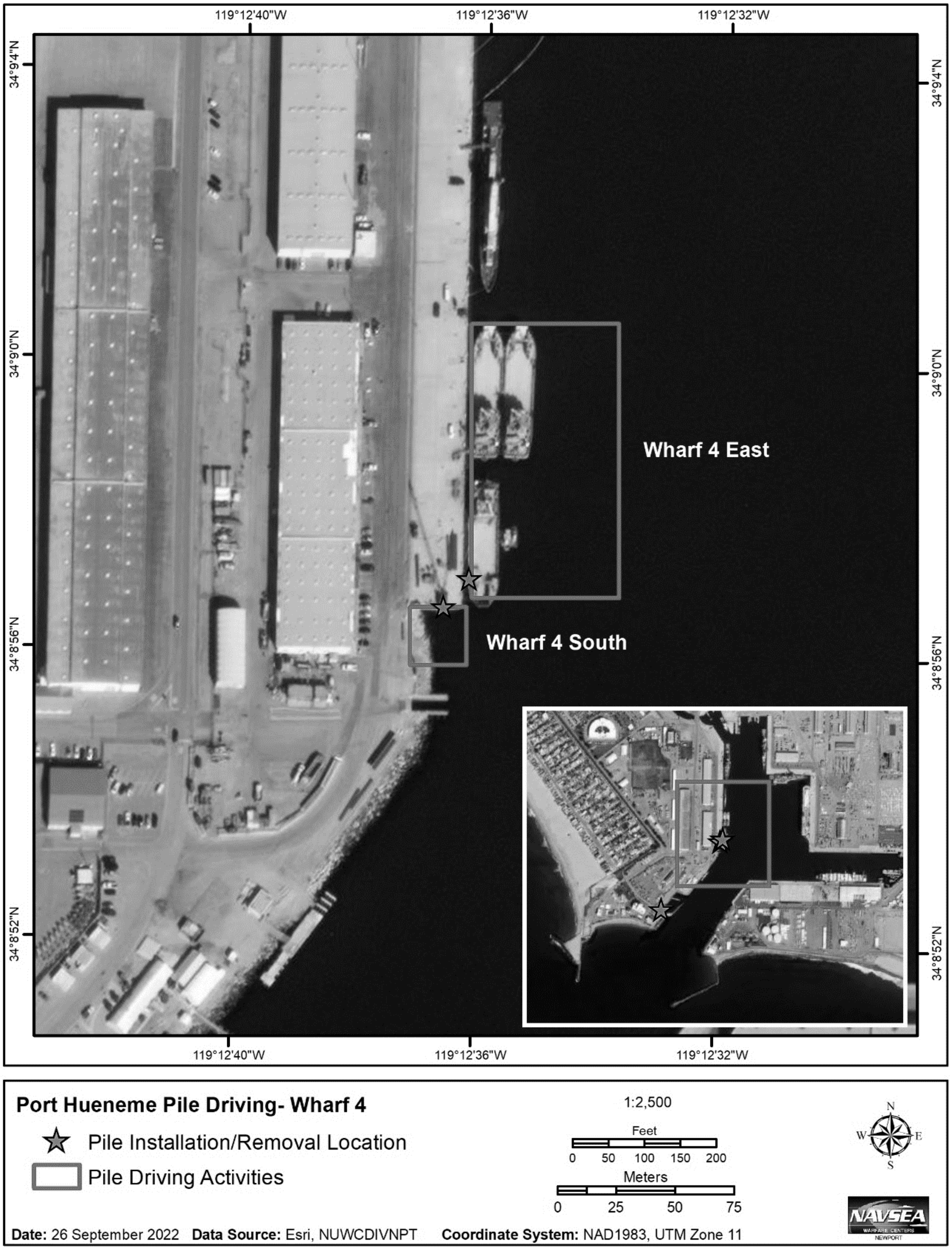

Figure 1. Proposed action area for pile driving exercises at Wharf 4

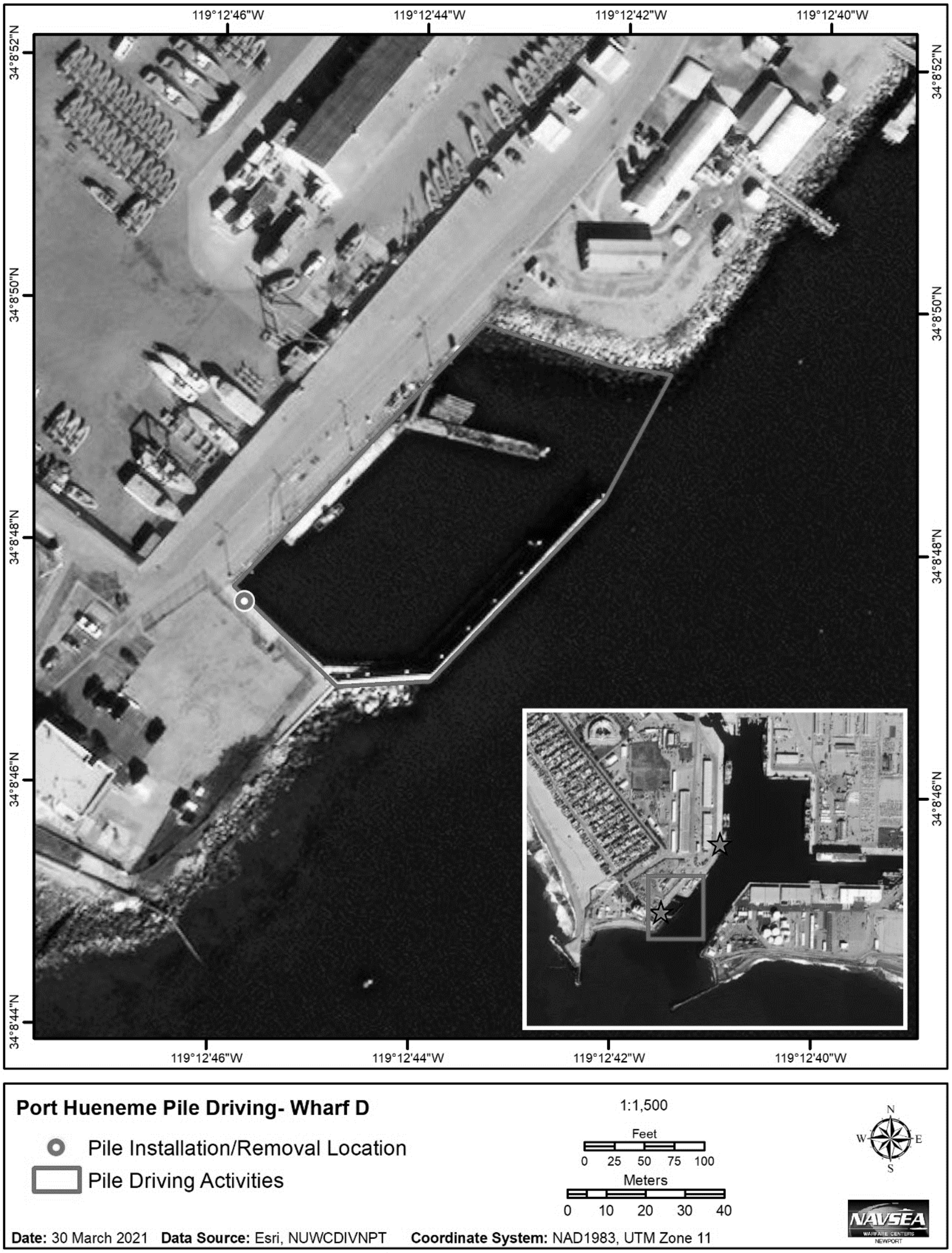

Figure 2. Proposed action area for pile driving exercises at Wharf D

Detailed Description of Specific Activity

The specific components of each exercise may vary based on the specific training requirements for each battalion, but could include steel sheet pile driving and round pile driving. Therefore, the proposed action laid out herein is based on the components that would result in the most piles being driven through the duration of the exercise. For all pile driving efforts, a 50-ton crane would be placed on either the southernmost or easternmost end of Wharf 4, or along the western wall of Wharf D, and would be used for both installation and removal of the piles. Impact pile driving would use a DELMAG D12-32 (or similar) diesel hammer, while vibratory pile driving would use a vibratory hammer. Various moveable floats, or potentially a small boat, would be used to provide in-, or near,-water support for the pile installation and/or removal. Only one hammer would be used at any given point in time; there would not be any instances where multiple piles would be driven simultaneously. All piles would be removed using a vibratory hammer.

Steel Sheet Pile Driving

The sheet pile wall would be constructed in one of two ways: either as a continuous wall or as a set of up six sheet piles repeatedly driven in the same location to reach a certain number of piles in a smaller space. In this case, up to six piles would be driven, then all but one removed before the process would begin again.

Steel sheet piles are “Z” shaped and made of corrugated steel. Each sheet pile would be 24-inches wide, 3/4-inch thick and with a height of 16.14 inches. The total footprint of the disturbed area due to each sheet pile would be approximately 2.7 square feet (ft) (0.25 square meters (m)). Once the first sheet pile is driven, each subsequent sheet pile would be interlocked with the pile next to it. The crane would slide a pile into the locking channel of the adjacent pile, then into the water. Once the undriven pile is stable, the crane would release the pile, swing the vibratory hammer over and attach it to the pile. Vibratory pile driving would be the only means of driving sheet piles. Each pile would be driven to a depth of approximately 30 ft (9 meters (m)) into the seafloor. Installation of each sheet pile would take approximately 1.5 hours to complete, with up to ten minutes of driving during that timeframe. Removal of each sheet pile would take approximately 20 minutes.

Three sheet piles would typically be driven into place during each operating day. Each workday is anticipated to last approximately eight hours, which would include pile driving and supporting pierside activities. Up to 5 days of steel sheet pile installation and 5 days of steel sheet removal would occur per training exercise.

Two 14-inch steel H-beam piles would be driven per exercise in order to support templates for placing steel sheets. These H-beam piles would typically be driven using a vibratory hammer, but there is potential that they could be driven via impact hammer. Installation and removal of the two H-beam piles would take one day, respectively. This exercise is summarized in Table 1.

Table 1. Summary of Pile Details and Estimated Effort Required for Pile Installation and Removal

Pile Type / Shape	Size	Number of Sheets / Piles	Vibratory Installation / Removal Duration Per Pile/Sheet (minutes)	Potential Impact Strikes per Pile, if Needed	Production Rate (piles / day)		Days of Installation	Days of Removal
					Installation	Removal		
Steel Sheet	24-in	15	10/20	NA	3	3	5	5
Timber Pile	16-in	10	20/30	1800	2	2	5	5
H-Beam	14-in	4	20/30	1800	2	2	2	2
Project Totals		**29**	**7.17 hours/12 hours**	**--**	**--**	**--**	**12 days**	**12 days**

Round Pile Driving

Round timber piles would also be driven using either vibratory or impact pile driving methods. The Navy anticipates that installation and removal of round piles would take 5 days, respectively. Additional details regarding installation and removal rates are included in Table 1.

An example of the type of training exercise using round timber piles is the construction of a round pile pier. The constructed round pile pier would consist of up to ten, but typically six, 16-inch round pier piles spaced approximately 13 ft (4 m) apart and a pre-fabricated pier affixed to the piles above the waterline. After completion of site feasibility and a survey to ensure no obstructions at the seafloor, a guide system would be put in place (approximately 10 to 15 ft [3 to 4.5 m] into the seafloor) in order to ensure piles are driven in the correct location and straight into the seafloor. The guide system would minimize the movement of a pile once the driving has commenced, and would utilize two steel H-beam piles to hold a template place. The piles would be lifted into place using the crane and the pile driver would be used to embed each pile to a depth of 30 to 35 ft (9 to 11 m) into the seafloor. It is expected that each timber pile would take approximately four hours to be installed into the seafloor, and that two piles per day would be installed; therefore, each day of pile installation would last for eight hours. Active pile installation time for each pile would be approximately 20 minutes. H-beam piles would typically be driven using a vibratory hammer, but there is potential that they could be driven via impact hammer. Installation of each H-beam pile is anticipated to take 20 minutes, and up to two H-beam piles would be installed in one day. This exercise is summarized in Table 1.

Once the pile driving is complete, the guide system (*i.e.,* the H–beam piles) would be removed and the U.S. Naval Mobile Construction Battalion personnel (known as Seabees) would build the decking system pier-side on Wharf 4 or Wharf D. The decking system would then be lifted by the crane onto the round piles, and the Seabees would secure the deck to the piles. At this point, the pier installation would be complete, and the decking would be detached from the piles and lifted back to land by the crane. The piles would be removed from the sediment one-by-one with the vibratory hammer and placed onto the wharf. The Navy anticipates each timber pile would take approximately 30 minutes to remove via a vibratory hammer and that up to 2 timber piles would be removed each day. They further anticipate that each H-beam pile would take approximately 30 minutes to remove via a vibratory hammer and that up to 2 H-beam piles would be removed each day.

All piles used for this exercise would be washed thoroughly at the NBVC Wash Rack area, which is a self-contained system that ensures the runoff from pile washing would have no environmental impact. The piles would be staged at the NCG-1 staging yard.

Proposed mitigation, monitoring, and reporting measures are described in detail later in this document (please see **Proposed Mitigation** and **Proposed Monitoring and Reporting**).

Description of Marine Mammals in the Area of Specified Activities

Sections 3 and 4 of the application summarize available information regarding status and trends, distribution and habitat preferences, and behavior and life history of the potentially affected species. NMFS fully considered all of this information, and we refer the reader to these descriptions, incorporated here by reference, instead of reprinting the information. Additional information regarding population trends and threats may be found in NMFS' Stock Assessment Reports (SARs; *www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments*) and more general information about these species (*e.g.*, physical and behavioral descriptions) may be found on NMFS' website (*https://www.fisheries.noaa.gov/find-species)*.

Table 2 lists all species or stocks for which take is expected and proposed to be authorized for this action, and summarizes information related to the population or stock, including regulatory status under the MMPA and Endangered Species Act (ESA) and potential biological removal (PBR), where known. PBR is defined by the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population (as described in NMFS' SARs). While no serious injury or mortality is anticipated or authorized here, PBR and annual serious injury and mortality from anthropogenic sources are included here as gross indicators of the status of the species and other threats.

Marine mammal abundance estimates presented in this document represent the total number of individuals that make up a given stock or the total number estimated within a particular study or survey area. NMFS' stock abundance estimates for most species represent the total estimate of individuals within the geographic area, if known, that comprises that stock. For some species, this geographic area may extend beyond U.S. waters. All managed stocks in this region are assessed in NMFS' U.S. Pacific SARs (*e.g.*, Carretta *et al*., 2022). All values presented in Table 2 are the most recent available at the time of publication and are available in the 2021 SARs (Carretta *et al*., 2022) (available online at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/draft-marine-mammal-stock-assessment-reports*).

Table 2. Species Likely Impacted by the Specified Activities

Common name	Scientific name	MMPA Stock	ESA/MMPA status; Strategic (Y/N)[1]	Stock abundance Nbest, (CV, N_{min}, most recent abundance survey)[2]	PBR	Annual M/SI[3]
Order Carnivora – Superfamily Pinnipedia						
Family Otariidae (eared seals and sea lions)						
California sea lion	*Zalophus californianus*	U.S.	-,-, N	257,606 (N.A.; 233,515; 2014)	14,011	>320
Family Phocidae (earless seals)						
Harbor seal	*Phoca vitulina richardii*	California	-,-, N	30,968 (N.A.; 27,348; 2012)	1,641	43

[1] - Endangered Species Act (ESA) status: Endangered (E), Threatened (T)/MMPA status: Depleted (D). A dash (-) indicates that the species is not listed under the ESA or designated as depleted under the MMPA. Under the MMPA, a strategic stock is one for which the level of direct human-caused mortality exceeds PBR or which is determined to be declining and likely to be listed under the ESA within the foreseeable future. Any species or stock listed under the ESA is automatically designated under the MMPA as depleted and as a strategic stock.
[2]- NMFS marine mammal stock assessment reports online at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments.* CV is coefficient of variation; N_{min} is the minimum estimate of stock abundance. In some cases, CV is not applicable (N.A.).
[3] - These values, found in NMFS's SARs, represent annual levels of human-caused mortality plus serious injury from all sources combined (*e.g.*, commercial fisheries, ship strike). Annual M/SI often cannot be determined precisely and is in some cases presented as a minimum value or range. A CV associated with estimated mortality due to commercial fisheries is presented in some cases.

As indicated above, the 2 species (with 2 managed stocks) in Table 2 temporally and spatially co-occur with the activity to the degree that take is reasonably likely to occur.

California sea lion

California sea lions occur in the eastern North Pacific from Puerto Vallarta, Mexico, through the Gulf of California and north along the west coast of North America to the Gulf of Alaska (Jefferson *et al*., 2015; Maniscalco *et al*., 2004). International agreements between the U.S., Mexico, and Canada for joint management of California sea lions do not exist; therefore, California sea lions observed at rookeries north of the U.S./Mexico border are considered part of the U.S. stock. California sea lions are the most abundant pinniped found along the California coast.

During the summer, California sea lions typically congregate near rookery islands and specific open-water areas. The primary rookeries off the coast of the U.S. are on San Nicolas, San Miguel, Santa Barbara, and San Clemente Islands (Lowry *et al.,* 2008; Lowry and Forney, 2005; Lowry *et al.,* 2017). Sea lions breed on the offshore islands of southern and central California from May through July (Heath and Perrin, 2009). During the non-breeding season, adult and subadult males and juveniles migrate northward along the coast to central and northern California, Oregon, Washington, and Vancouver Island (Jefferson *et al.,* 1993). They return south the following spring (Heath and Perrin, 2008, Lowry and Forney, 2005). Females and some juveniles tend to remain closer to rookeries (Antonelis *et al.,* 1990; Melin *et al.,* 2008). Pupping occurs primarily on the California Channel Islands from late May until the end of June (Peterson and Bartholomew, 1967). Weaning and mating occur in late spring and summer during the peak upwelling period (Bograd *et al.,* 2009). After the mating season, adult males migrate northward to feeding areas as far away as the Gulf of Alaska (Lowry *et al.,* 1992), and they remain away until spring (March-May), when they migrate back to the breeding colonies. Adult females generally remain south of Monterey Bay, California throughout the year, feeding in coastal waters in the summer and offshore waters in the winter, alternating between foraging and nursing their pups on shore until the next pupping/breeding season (Melin and DeLong, 2000; Melin *et al.,* 2008).

California sea lions are known to feed in both benthic and open-water habitats, and have a broad diet range, feeding on a variety of fish and cephalopod species depending on the environment. Common prey items include salmon, Pacific sardines (*Sardinops sagax*), northern anchovy (*Engraulis mordax*), mackerel, Pacific whiting (*Merluccius productus*), rockfish, market squid (*Loligo opalescens*), bass, cutlassfish, cusk eels, greenlings, dogfish, perch, and various flatfish (Lowry and Forney, 2005; Orr *et al*., 2011,; Orr *et al*., 2012), midshipmen and lanternfish (Lowry and Forney, 2005; Orr *et al*., 2011; Orr *et al.,* 2012). Dive durations range from 1.4 to 5 minutes, with longer dives during El Niño events; sea lions dive about 32 to 47 percent of the time at sea (Feldkamp *et al*., 1989; Kuhn and Costa, 2014; Melin and DeLong, 2000; Melin *et al*., 2008). Adult females alternate between nursing their pup on shore and foraging at sea, spending approximately 67 to 77 percent of time at sea (Kuhn and Costa, 2014; Melin and DeLong, 2000).

From January 2013 through September 2016, a greater than expected number of young malnourished California sea lions stranded along the coast of California. This event was classified as an unusual mortality event (UME) as defined under Section 410(6) of the MMPA as it was a stranding that was unexpected; involved a significant die-off of a marine mammal population, and demanded immediate response. Sea lions stranding from an early age (6-8 months old) through two years of age (hereafter referred to as juveniles) were consistently underweight without other disease processes detected. Of the 8,122 stranded juveniles attributed to the UME, 93 percent stranded alive (n = 7,587, with 3,418 of these released after rehabilitation) and 7 percent (n = 531) stranded dead. Several factors are hypothesized to have impacted the ability of nursing females and young sea lions to acquire adequate nutrition for successful pup rearing and juvenile growth. In late 2012, decreased anchovy and sardine recruitment (CalCOFI data, July 2013) may have led to nutritionally stressed adult females. Biotoxins were present at various times throughout the UME, and while they were not detected in the stranded juvenile sea lions (whose stomachs were empty at the time of stranding), biotoxins may have impacted the adult females' ability to support their dependent pups by affecting their cognitive function (*e.g.,* navigation, behavior towards their offspring). Therefore, the role of biotoxins in this UME, via its possible impact on adult females' ability to support their pups, is unclear. The proposed primary cause of the UME was malnutrition of sea lion pups and yearlings due to ecological factors. These factors included shifts in distribution, abundance and/or quality of sea lion prey items around the Channel Island rookeries during critical sea lion life history events (nursing by adult females, and transitioning from milk to prey by young sea lions). These prey shifts were most likely driven by unusual oceanographic conditions at the time due to the event known as the "Warm Water Blob" and El Niño. This investigation closed on May 6, 2020. Please refer to: *https://www.fisheries.noaa.gov/national/marine-life-distress/2013-2016-california-sea-lion-unusual-mortality-event-california* for more information on this UME.

California sea lions in the U.S. are not listed as "endangered" or "threatened" under the ESA or as "depleted" under the MMPA. They are also not considered "strategic" under the MMPA because human-caused mortality is less than the PBR. The fishery mortality and serious injury rate (197 animals/year) for this stock is less than 10 percent of the calculated PBR and, therefore, is considered to be insignificant and approaching a zero mortality and serious injury rate (Laake *et al.,* 2018). Expanding pinniped populations though have resulted in increased human-caused serious injury and mortality, due to shootings, entrainment in power plants, interactions with hook and line fisheries, separation of mothers and pups due to human disturbance, dog bites, and vessel and vehicle strikes (Carretta *et al*., 2021). Other threats to California sea lions include exposure to anthropogenic sound, algal neurotoxins, and increasing sea-surface temperatures in the California Current (Carretta *et al.,* 2021).

California sea lions are prone to invade human-modified coastal sites that provide good hauling out substrate, such as marina docks and floats, buoys, bait barges, small boats, and rip-rap tidal and wave protection structures. They are known to be present on these structures within the proposed action area, occasionally in large numbers. The primary sea lion haulout at NBVC is on and around the floating docks at Wharf D, though other areas are occasionally used. California sea lions were also frequently encountered swimming near the channel markers, and their presence within the proposed action area is considered "regular" according to the NBVC Integrated Natural Resources Management Plan (Department of the Navy, 2019).

Harbor Seal

Harbor seals are widely distributed in the North Atlantic and North Pacific. Two subspecies exist in the Pacific: *P. v. stejnegeri* in the western North Pacific, near Japan, and *P. v. richardii* in the eastern North Pacific (Burns, 2002; Jefferson *et al*., 2008). Of the two subspecies, only the eastern North Pacific subspecies would be found in the proposed action area. This subspecies inhabits near-shore coastal and estuarine areas from Baja California, Mexico, to the Pribilof Islands in Alaska. Previous assessments of the status of harbor seals have recognized three stocks along the west coast of the continental U.S.: 1) California, 2) Oregon and Washington outer coast waters, and 3) inland waters of Washington (Carretta *et al*., 2022). Harbor seals observed in the proposed action area are considered members of the California stock.

Harbor seals are rarely found more than 20 km (11 nautical miles) from shore (Baird, 2001) and are generally non-migratory (Burns, 2002; Jefferson *et al*., 2008) and solitary at sea, with local movements associated with such factors as tides, weather, season, food availability, and reproduction (Bigg, 1969, 1981; Boveng *et al*., 2012; Fisher, 1952; Hastings *et al*., 2004; Lowry *et al*,. 2001; Rehberg and Small, 2001; Scheffer and Slipp, 1944; Small *et al*,. 2005; Small *et al*., 2003; Swain *et al*., 1996). While primarily aquatic, harbor seals also use the coastal terrestrial environment, where they haul out of the water periodically on to rocks, reefs, beaches, and anthropogenic structures to regulate their body temperature, molt, interact with other seals, give birth, and raise their pups. Pupping occurs from March through May in central California (Codde and Allen, 2020). Pups are weaned in four weeks, most by mid-June (Codde and Allen, 2020). Harbor seals breed between late March and June. Harbor seals molt from May through June. Peak numbers of harbor seals haul out during late May to July, which coincides with the peak molt. During both pupping and molting seasons, the number of seals and the length of time hauled out per day increase, from an average of 7 hours per day to 10-12 hours (Harvey and Goley, 2011; Huber *et al*., 2001; Stewart and Yochem, 1994). They haul out in groups to avoid predators, with groups spending less time being watchful for predators than individuals that haul out alone.

Harbor seals feed in marine, estuarine, and occasionally fresh water environments. They tend to forage at night and haul out during the day with a peak in the afternoon between 1 p.m. and 4 p.m. (Grigg *et al*., 2012; Stewart and Yochem, 1994; Yochem *et al*., 1987). Tide levels affect the maximum number of seals hauled out, with the largest number of seals hauled out at low tide, but time of day and season have the greatest influence on haul out behavior (Manugian *et al*., 2017; Patterson and Acevedo-Gutiérrez, 2008; Stewart and Yochem, 1994).

Diving behavior analyses of harbor seals in shallow estuarine environments indicated that they spent more than 80 percent of their time diving in the upper portion of the water column at or above 185 ft (56 m), but exhibited relatively long duration dives (4.4 to 5.2 minutes) (Eguchi, 1998; Womble *et al*. 2014). Since the proposed action area is very shallow, with an average depth of 34.5 ft (10.5 m) at mean low water, it is likely that harbor seals, when present, would always be at or near the surface (Tetra Tech, 2012).

California harbor seals are not listed as “endangered” or “threatened” under the ESA, nor are they designated as “depleted” under the MMPA. Annual human-caused mortality does not exceed Potential Biological Removal (PBR) threshold for this stock, and they are not considered a “strategic” stock under the MMPA (Carretta *et al*., 2022). Despite this, expanding pinniped populations in general have resulted in increased human-caused serious injury and mortality, due to shootings, entrainment in power plants, interactions with recreational hook and line fisheries, separation of mothers and pups due to human disturbance, dog bites, and vessel and vehicle strikes (Carretta *et al*. 2022).

Small numbers of harbor seals are found hauled out on coastal and island sites and forage in the nearshore waters of Southern California, but are found in only moderate numbers compared to sea lions and elephant seals. In California, approximately 400-600 harbor seal haulout sites are widely distributed along the mainland and on offshore islands, including intertidal sandbars, rocky shores and beaches (Hanan, 1996; Lowry e*t al.,* 2008). The harbor seal haul-out sites include several areas along the coast of La Jolla in San Diego County and most of the Channel Islands (Lowry *et al*., 2008; Lowry *et al*., 2017). Harbor seals have been reported hauling out on the beach just outside the mouth of Port Hueneme Harbor, but the Integrated Natural Resources Management Plan for NBVC categorizes their presence on the beach as "rare" (Department of the Navy, 2019). Pacific harbor seals are also considered rare in Port Hueneme and no harbor seal haul-outs are present in the action area.

Marine Mammal Hearing

Hearing is the most important sensory modality for marine mammals underwater, and exposure to anthropogenic sound can have deleterious effects. To appropriately assess the potential effects of exposure to sound, it is necessary to understand the frequency ranges marine mammals are able to hear. Not all marine mammal species have equal hearing capabilities (*e.g*., Richardson *et al.*, 1995; Wartzok and Ketten, 1999; Au and Hastings, 2008). To reflect this, Southall *et al.* (2007, 2019) recommended that marine mammals be divided into hearing groups based on directly measured (behavioral or auditory evoked potential techniques) or estimated hearing ranges (behavioral response data, anatomical modeling, etc.). Note that no direct measurements of hearing ability have been successfully completed for mysticetes (*i.e*., low-frequency cetaceans). Subsequently, NMFS (2018) described generalized hearing ranges for these marine mammal hearing groups. Generalized hearing ranges were chosen based on the approximately 65 decibel (dB) threshold from the normalized composite audiograms, with the exception for lower limits for low-frequency cetaceans where the lower bound was deemed to be biologically implausible and the lower bound from Southall *et al.* (2007) retained. Marine mammal hearing groups and their associated hearing ranges are provided in Table 3.

Table 3. Marine Mammal Hearing Groups (NMFS, 2018)

Hearing Group	Generalized Hearing Range*
Low-frequency (LF) cetaceans (baleen whales)	7 Hz to 35 kHz
Mid-frequency (MF) cetaceans (dolphins, toothed whales, beaked whales, bottlenose whales)	150 Hz to 160 kHz
High-frequency (HF) cetaceans (true porpoises, *Kogia*, river dolphins, Cephalorhynchid, *Lagenorhynchus cruciger* & *L. australis*)	275 Hz to 160 kHz
Phocid pinnipeds (PW) (underwater) (true seals)	50 Hz to 86 kHz
Otariid pinnipeds (OW) (underwater) (sea lions and fur seals)	60 Hz to 39 kHz
* Represents the generalized hearing range for the entire group as a composite (*i.e.*, all species within the group), where individual species' hearing ranges are typically not as broad. Generalized hearing range chosen based on ~65 dB threshold from normalized composite audiogram, with the exception for lower limits for LF cetaceans (Southall *et al*., 2007) and PW pinniped (approximation).	

The pinniped functional hearing group was modified from Southall *et al*. (2007) on the basis of data indicating that phocid species have consistently demonstrated an extended frequency range of hearing compared to otariids, especially in the higher frequency range (Hemilä *et al*., 2006; Kastelein *et al*., 2009; Reichmuth and Holt, 2013).

For more detail concerning these groups and associated frequency ranges, please see NMFS (2018) for a review of available information.

Potential Effects of Specified Activities on Marine Mammals and their Habitat

This section includes a discussion of the ways that components of the specified activity may impact marine mammals and their habitat. The **Estimated Take** section later in this document includes a quantitative analysis of the number of individuals that are expected to be taken by this activity. The **Negligible Impact Analysis and**

Determination section considers the content of this section, the **Estimated Take** section, and the **Proposed Mitigation** section, to draw conclusions regarding the likely impacts of these activities on the reproductive success or survivorship of individuals and how those impacts are reasonably expected to, or reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival.

Acoustic effects on marine mammals during the specified activity can occur from impact and vibratory pile driving. The effects of underwater noise from the Navy's proposed activities have the potential to result in Level B harassment of marine mammals in the action area.

Description of Sound Sources

This section contains a brief technical background on sound, on the characteristics of certain sound types, and on metrics used in this proposal inasmuch as the information is relevant to the specified activity and to a discussion of the potential effects of the specified activity on marine mammals found later in this document. For general information on sound and its interaction with the marine environment, please see, *e.g.*, Au and Hastings (2008); Richardson *et al*. (1995); Urick (1983).

Sound travels in waves, the basic components of which are frequency, wavelength, and amplitude. Frequency is the number of pressure waves that pass by a reference point per unit of time and is measured in hertz (Hz) or cycles per second. Wavelength is the distance between two peaks or corresponding points of a sound wave (length of one cycle). Higher frequency sounds have shorter wavelengths than lower frequency sounds, and typically attenuate (decrease) more rapidly, except in certain cases in shallower water. Amplitude is the height of the sound pressure wave or the "loudness" of a sound and is typically described using the relative unit of the dB. A sound pressure level (SPL) in dB is described as the ratio between a measured pressure and a reference pressure (for underwater sound, this is 1 microPascal (μPa)), and is a logarithmic unit that accounts for large variations in amplitude; therefore, a relatively small change in dB corresponds to large changes in sound pressure. The source level represents the SPL referenced at a distance of 1 m from the source (referenced to 1 μPa), while the received level is the SPL at the listener's position (referenced to 1 μPa). The received level is the sound level at the listener's position. Note that all underwater sound levels in this document are referenced to a pressure of 1 μPa and all airborne sound levels in this document are referenced to a pressure of 20 μPa.

Root mean square (RMS) is the quadratic mean sound pressure over the duration of an impulse. RMS is calculated by squaring all of the sound amplitudes, averaging the squares, and then taking the square root of the average (Urick, 1983). RMS accounts for both positive and negative values; squaring the pressures makes all values positive so that they may be accounted for in the summation of pressure levels (Hastings and Popper, 2005). This measurement is often used in the context of discussing behavioral effects, in part because behavioral effects, which often result from auditory cues, may be better expressed through averaged units than by peak pressures.

Sound exposure level (SEL; represented as dB referenced to 1 μPa squared per second (re 1 μPa2-s)) represents the total energy in a stated frequency band over a stated time interval or event, and considers both intensity and duration of exposure. The per-pulse SEL is calculated over the time window containing the entire pulse (*i.e.*, 100 percent of the acoustic energy). SEL is a cumulative metric; it can be accumulated over a single pulse, or calculated over periods containing multiple pulses. Cumulative SEL (SELcum) represents the total energy accumulated by a receiver over a defined time window or during an event. Peak sound pressure (also referred to as zero-to-peak sound pressure or 0-pk) is the maximum instantaneous sound pressure measurable in the water at a specified distance from the source, and is represented in the same units as the RMS sound pressure.

When underwater objects vibrate or activity occurs, sound-pressure waves are created. These waves alternately compress and decompress the water as the sound wave travels. Underwater sound waves radiate in a manner similar to ripples on the surface of a pond and may be either directed in a beam or beams or may radiate in all directions (omnidirectional sources), as is the case for sound produced by the construction activities considered here. The compressions and decompressions associated with sound waves are detected as changes in pressure by aquatic life and man-made sound receptors such as hydrophones.

Even in the absence of sound from the specified activity, the underwater environment is typically loud due to ambient sound, which is defined as the all-encompassing sound in a given place and is usually a composite of sound from many sources both near and far (American National Standards Institute standards (ANSI), 1995). The sound level of a region is defined by the total acoustical energy being generated by known and unknown sources. These sources may include physical (*e.g.*, wind and waves, earthquakes, ice, atmospheric sound), biological (*e.g.*, sounds produced by marine mammals, fish, and invertebrates), and anthropogenic (*e.g.*, vessels, dredging, construction) sound. A number of sources contribute to ambient sound, including wind and waves, which are a main source of naturally occurring ambient sound for frequencies between 200 Hz and 50 kilohertz (kHz) (Mitson, 1995). In general, ambient sound levels tend to increase with increasing wind speed and wave height. Precipitation can become an important component of total sound at frequencies above 500 Hz, and possibly down to 100 Hz during quiet times. Marine mammals can contribute significantly to ambient sound levels, as can some fish and snapping shrimp. The frequency band for biological contributions is from approximately 12 Hz to over 100 kHz. Sources of ambient sound related to human activity include transportation (surface vessels), dredging and construction, oil and gas drilling and production, geophysical surveys, sonar, and explosions. Vessel noise typically dominates the total ambient sound for frequencies between 20 and 300 Hz. In general, the frequencies of anthropogenic sounds are below 1 kHz and, if higher frequency sound levels are created, they attenuate rapidly.

No direct data on ambient noise levels within Port Hueneme are available; however, in-water ambient noise levels are considered comparable to similar ports and harbors. McKenna *et al*. (2013) observed as many as 18 container ships per day transiting through or past Port Hueneme in the Santa Barbara Channel, with sound level per ship varying with vessel speed, but ranging from 175 to 195 dB re 1 μPa2 at 1 m with frequencies ranging from 20 to 1,000 Hz. Though this is outside the proposed action area, it illustrates the high vessel volume in the region. Similarly, Kipple and Gabriel (2004) found that ship noise was characterized by a broad frequency range (roughly 0.1 to 35 kHz), with peak noise at higher frequency for smaller vessels. Similar broad-spectrum (10 Hz to more than 1 kHz) noise has been reported for a variety of categories of ships (National Research Council, 2003). Port Hueneme Harbor is co-owned by NBVC, Port Hueneme, and the Oxnard Harbor District, and the commercial port sees 8 billion dollars annually in goods movement, with multiple berths for large cargo ships (Port of Hueneme, 2019). Maintenance of the port for accommodation of those large cargo ships includes dredging, which also increases the soundscape underwater.

Ambient noise levels in ports and harbors vary by location, but generally exceed the Level B harassment threshold for continuous noise of 120 dB RMS in heavily trafficked locations. For example, from 2014 to 2015, ambient noise data was collected in the northern portion of the San Diego Bay during ten separate deployments of 3 days each. During those deployments, ambient noise levels ranged from 126 to 146 dB RMS, with typical ambient levels around 129 to 130 dB RMS (Naval Facilities Engineering Command Southwest; NAVFAC SW, 2020). More recent ambient data collected in the south-central San Diego Bay (an area with less vessel traffic than the north San Diego

Bay), showed ambient SPLs ranging from 121 to 131 dB RMS, and an average ambient SPL at 126 dB RMS (Dahl and Dall'Osto, 2019). Similar ports with large container ship transits also had ambient levels that were higher than the regulatory 120 dB RMS threshold, with ambient SPLs at different locations in Puget Sound measured at 128 dB RMS (Washington State Department of Transportation, 2012) and between 132 and 143 dB RMS (Strategic Environmental Consulting, 2005), while in San Francisco Bay ambient SPLs were measured at 133 dB RMS (Laughlin, 2006).

While no ambient data is available for the specific proposed project area, it is assumed that, due to both the Navy's and commercial use of Port Hueneme, ambient SPLs will be higher than the 120 dB RMS regulatory threshold for continuous noise. However, absent specific values for the project location, all acoustical analyses for continuous noise sources (*i.e.*, vibratory pile driving) will be assessed relative to the 120 dB RMS Level B harassment threshold.

Two types of hammers would be used on this project: impact and vibratory. The sounds produced by these hammers fall into one of two general sound types: impulsive and non-impulsive (defined below). The distinction between these two sound types is important because they have differing potential to cause physical effects, particularly with regard to hearing (*e.g.*, Ward, 1997 in Southall *et al.,* 2007). Please see Southall *et al*. (2007) for an in-depth discussion of these concepts.

Impulsive sound sources (*e.g.*, explosions, gunshots, sonic booms, impact pile driving) produce signals that are brief (typically considered to be less than one second), broadband, atonal transients (ANSI, 1986; Harris, 1998; National Institute for Occupational Safety and Health (NIOSH), 1998; International Organization for Standardization (ISO) 2003; ANSI 2005) and occur either as isolated events or repeated in some succession. Impulsive sounds are all characterized by a relatively rapid rise from ambient pressure to a maximal pressure value followed by a rapid decay period that may include a period of diminishing, oscillating maximal and minimal pressures, and generally have an increased capacity to induce physical injury as compared with sounds that lack these features.

Non-impulsive sounds can be tonal, narrowband, or broadband, brief or prolonged, and may be either continuous or non-continuous (ANSI, 1995; NIOSH, 1998). Some of these non-impulsive sounds can be transient signals of short duration but without the essential properties of impulses (*e.g*., rapid rise time). Examples of non-impulsive sounds include those produced by vessels, aircraft, machinery operations such as drilling or dredging, vibratory pile driving, and active sonar systems. The duration of such sounds, as received at a distance, can be greatly extended in a highly reverberant environment.

Impact hammers operate by repeatedly dropping and/or pushing a heavy piston onto a pile to drive the pile into the substrate. Sound generated by impact hammers is characterized by rapid rise times and high peak levels, a potentially injurious combination (Hastings and Popper, 2005). Vibratory hammers install piles by vibrating them and allowing the weight of the hammer to push them into the sediment. Vibratory hammers produce significantly less sound than impact hammers. Peak Sound Pressure Levels (SPLs) may be 180 dB or greater, but are generally 10 to 20 dB lower than SPLs generated during impact pile driving of the same-sized pile (Oestman *et al.,* 2009). Rise time is slower, reducing the probability and severity of injury, and sound energy is distributed over a greater amount of time (Nedwell and Edwards, 2002; Carlson *et al.*, 2005).

The likely or possible impacts of the Navy's proposed activity on marine mammals could involve both non-acoustic and acoustic stressors. Potential non-acoustic stressors could result from the physical presence of the equipment and personnel; however, any impacts to marine mammals are expected to primarily be acoustic in nature.

Acoustic stressors include effects of heavy equipment operation during pile installation and removal.

Acoustic Impacts

The introduction of anthropogenic noise into the aquatic environment from pile driving and removal is the primary means by which marine mammals may be harassed from the Navy's specified activity. In general, animals exposed to natural or anthropogenic sound may experience physical and psychological effects, ranging in magnitude from none to severe (Southall *et al.,* 2007; 2019). In general, exposure to pile driving noise has the potential to result in auditory threshold shifts and behavioral reactions (*e.g.*, avoidance, temporary cessation of foraging and vocalizing, changes in dive behavior). Exposure to anthropogenic noise can also lead to non-observable physiological responses such an increase in stress hormones. Additional noise in a marine mammal's habitat can mask acoustic cues used by marine mammals to carry out daily functions such as communication and predator and prey detection. The effects of pile driving noise on marine mammals are dependent on several factors, including, but not limited to, sound type (*e.g.,* impulsive vs. non-impulsive), the species, age and sex class (*e.g.,* adult male vs. mom with calf), duration of exposure, the distance between the pile and the animal, received levels, behavior at time of exposure, and previous history with exposure (Wartzok *et al.,* 2004; Southall *et al.,* 2007, Ellison *et al.*, 2012, and Southall *et al.*, 2021). Here we discuss physical auditory effects (threshold shifts) followed by behavioral effects and potential impacts on habitat.

NMFS defines a noise-induced threshold shift (TS) as a change, usually an increase, in the threshold of audibility at a specified frequency or portion of an individual's hearing range above a previously established reference level (NMFS, 2018). The amount of threshold shift is customarily expressed in dB. A TS can be permanent or temporary. As described in NMFS (2018), there are numerous factors to consider when examining the consequence of TS, including, but not limited to, the signal temporal pattern (*e.g.,* impulsive or non-impulsive), likelihood an individual would be exposed for a long enough duration or to a high enough level to induce a TS, the magnitude of the TS, time to recovery (seconds to minutes or hours to days), the frequency range of the exposure (*i.e.,* spectral content), the hearing and vocalization frequency range of the exposed species relative to the signal's frequency spectrum (*i.e.,* how animal uses sound within the frequency band of the signal; *e.g.,* Kastelein *et al.,* 2014), and the overlap between the animal and the source (*e.g.,* spatial, temporal, and spectral). When analyzing the auditory effects of noise exposure, it is often helpful to broadly categorize sound as either impulsive or non-impulsive. When considering auditory effects, vibratory pile driving is considered a non-impulsive source while impact pile is treated as an impulsive source.

Permanent Threshold Shift (PTS)—NMFS defines PTS as a permanent, irreversible increase in the threshold of audibility at a specified frequency or portion of an individual's hearing range above a previously established reference level (NMFS, 2018). Available data from humans and other terrestrial mammals indicate that a 40 dB threshold shift approximates PTS onset (see Ward *et al.,* 1958, 1959; Ward, 1960; Kryter *et al.,* 1966; Miller, 1974; Ahroon *et al.,* 1996; Henderson *et al.,* 2008). PTS levels for marine mammals are estimates, as with the exception of a single study unintentionally inducing PTS in a harbor seal (Kastak *et al.,* 2008), there are no empirical data measuring PTS in marine mammals largely due to the fact that, for various ethical reasons, experiments involving anthropogenic noise exposure at levels inducing PTS are not typically pursued or authorized (NMFS, 2018).

Temporary Threshold Shift (TTS)—A temporary, reversible increase in the threshold of audibility at a specified frequency or portion of an individual's hearing range above a previously established reference level (NMFS, 2018). Based on data from cetacean TTS measurements (see Southall *et al.,* 2007), a TTS of 6 dB is considered the minimum threshold shift clearly larger than any day-to-day or session-to-session variation in a subject's normal hearing ability (Schlundt *et al.,* 2000; Finneran *et al.,* 2000, 2002). As described in Finneran (2015), marine mammal studies have shown the amount of TTS increases with SELcum in an accelerating fashion: at low exposures with lower SELcum, the amount of TTS is typically small and the growth curves have shallow slopes. At exposures with higher SELcum, the growth curves become steeper and approach linear relationships with the noise SEL.

Depending on the degree (elevation of threshold in dB), duration (*i.e.,* recovery time), and frequency range of TTS, and the context in which it is experienced, TTS can have effects on marine mammals ranging from discountable to serious (similar to those discussed in auditory masking, below). For example, a marine mammal may be able to readily compensate for a brief, relatively small amount of TTS in a non-critical frequency range that takes place during a time when the animal is traveling through the open ocean, where ambient noise is lower and there are not as many competing sounds present. Alternatively, a larger amount and longer duration of TTS sustained during time when communication is critical for successful mother/calf interactions could have more serious impacts. We note that reduced hearing sensitivity as a simple function of aging has been observed in marine mammals, as well as humans and other taxa (Southall *et al.*, 2007), so we can infer that strategies exist for coping with this condition to some degree, though likely not without cost.

Relationships between TTS and PTS thresholds have not been studied in marine mammals, but such relationships are assumed to be similar to those in humans and other terrestrial mammals. PTS typically occurs at exposure levels at least several decibels above (a 40-dB threshold shift approximates PTS onset; *e.g.*, Kryter *et al*., 1966; Miller, 1974) that inducing mild TTS (a 6-dB threshold shift approximates TTS onset; *e.g.*, Southall *et al*., 2007). Based on data from terrestrial mammals, a precautionary assumption is that the PTS thresholds for impulsive sounds (such as impact pile driving pulses as received close to the source) are at least 6 dB higher than the TTS threshold on a peak-pressure basis and PTS cumulative sound exposure level thresholds are 15 to 20 dB higher than TTS cumulative sound exposure level thresholds (Southall *et al*., 2007). Given the higher level of sound or longer exposure duration necessary to cause PTS as compared with TTS, it is considerably less likely that PTS could occur.

TTS is the mildest form of hearing impairment that can occur during exposure to sound (Kryter, 1985). While experiencing TTS, the hearing threshold rises, and a sound must be at a higher level in order to be heard. In terrestrial and marine mammals, TTS can last from minutes or hours to days (in cases of strong TTS). In many cases, hearing sensitivity recovers rapidly after exposure to the sound ends. Currently, TTS data only exist for four species of cetaceans (bottlenose dolphin (*Tursiops truncatus*), beluga whale (*Delphinapterus leucas*), harbor porpoise, and Yangtze finless porpoise (*Neophocoena asiaeorientalis*)) and six species of pinnipeds (northern elephant seal (*Mirounga angustirostris*), harbor seal, ring seal (*Pusa hispida*), spotted seal (*Phoca largha*), bearded seal (*Erignathus barbatus*), and California sea lion) that were exposed to a limited number of sound sources (*i.e.*, mostly tones and octave-band noise with limited number of exposure to impulsive sources such as seismic airguns or impact pile driving) in laboratory settings (Southall *et al*., 2019). No data are available on noise-induced hearing loss for mysticetes. For summaries of data on TTS in marine mammals or for further discussion of TTS onset thresholds, please see Southall *et al.*, (2019), and NMFS (2018).

Installing piles requires a combination of impact pile driving and vibratory pile driving. For the project, these activities will not occur at the same time and there will be pauses in activities producing the sound during each day. Given these pauses and that many marine mammals are likely moving through the project area and not remaining for extended periods of time, the potential for TTS declines.

Behavioral Harassment—Exposure to noise from pile driving and removal also has the potential to behaviorally disturb marine mammals. Behavioral disturbance may include a variety of effects, including subtle changes in behavior (*e.g.*, minor or brief avoidance of an area or changes in vocalizations), more conspicuous changes in similar behavioral activities, and more sustained and/or potentially severe reactions, such as displacement from or abandonment of high-quality habitat. Disturbance may result in changing durations of surfacing and dives, changing direction and/or speed; reducing/increasing vocal activities; changing/cessation of certain behavioral activities (such as socializing or feeding); eliciting a visible startle response or aggressive behavior (such as tail/fin slapping or jaw clapping); avoidance of areas where sound sources are located. Pinnipeds may increase their haul out time, possibly to avoid in-water disturbance (Thorson and Reyff, 2006). Behavioral responses to sound are highly variable and context-specific and any reactions depend on numerous intrinsic and extrinsic factors (*e.g.,* species, state of maturity, experience, current activity, reproductive state, auditory sensitivity, time of day), as well as the interplay between factors (*e.g.,* Richardson *et al.,* 1995; Wartzok *et al.,* 2003; Southall *et al.,* 2007; Weilgart, 2007; Archer *et al.,* 2010, Ellison *et al.*, 2019; Southall *et al*., 2021). Behavioral reactions can vary not only among individuals but also within an individual, depending on previous experience with a sound source, context, and numerous other factors (Ellison *et al.,* 2012), and can vary depending on characteristics associated with the sound source (*e.g.,* whether it is moving or stationary, number of sources, distance from the source). In general, pinnipeds seem more tolerant of, or at least habituate more quickly to, potentially disturbing underwater sound than do cetaceans, and generally seem to be less responsive to exposure to industrial sound than most cetaceans. Please see Richardson *et al.* (1995), Nowacek *et al.* (2007), Southall *et al.* (2007), Gomez et al. (2015), Southall *et al*. (2019), and Southall *et al*. (2021) for a review of responses of marine mammals to anthropogenic sounds. Habituation can occur when an animal's response to a stimulus wanes with repeated exposure, usually in the absence of unpleasant associated events (Wartzok *et al.*, 2003). Animals are most likely to habituate to sounds that are predictable and unvarying. It is important to note that habituation is appropriately considered as a "progressive reduction in response to stimuli that are perceived as neither aversive nor beneficial," rather than as, more generally, moderation in response to human disturbance (Bejder *et al*., 2009). The opposite process is sensitization, when an unpleasant experience leads to subsequent responses, often in the form of avoidance, at a lower level of exposure.

As noted above, behavioral state may affect the type of response. For example, animals that are resting may show greater behavioral change in response to disturbing sound levels than animals that are highly motivated to remain in an area for feeding (Richardson *et al*., 1995; NRC, 2003; Wartzok *et al*., 2003). Controlled experiments with captive marine mammals have showed pronounced behavioral reactions, including avoidance of loud sound sources (Ridgway *et al*., 1997; Finneran *et al*., 2003). Observed responses of wild marine mammals to loud pulsed sound sources (typically seismic airguns or acoustic harassment devices) have been varied but often consist of avoidance behavior or other behavioral changes suggesting discomfort (Morton and Symonds, 2002; see also Richardson *et al*., 1995; Nowacek *et al*., 2007).

Available studies show wide variation in response to underwater sound; therefore, it is difficult to predict specifically how any given sound in a particular instance might affect marine mammals perceiving the signal. If a marine mammal does react briefly to an underwater sound by changing its behavior or moving a small distance, the impacts of the change are unlikely to be significant to the individual, let alone the stock or population. However, if a sound source displaces marine mammals from an important feeding or breeding area for a prolonged period, impacts on individuals and populations could be significant (*e.g*., Lusseau and Bejder, 2007; Weilgart, 2007; NRC, 2005). However, there are broad categories of potential response, which we describe in greater detail here, that include alteration of dive behavior, alteration of foraging behavior, effects to breathing, interference with or alteration of vocalization, avoidance, and flight.

Changes in dive behavior can vary widely and may consist of increased or decreased dive times and surface intervals as well as changes in the rates of ascent and descent during a dive (*e.g*., Frankel and Clark, 2000; Costa *et al*., 2003; Ng and Leung, 2003; Nowacek *et al*., 2004; Goldbogen *et al*., 2013a,b). Variations in dive behavior may reflect interruptions in biologically significant activities (*e.g*., foraging) or they may be of little biological significance. The impact of an alteration to dive behavior resulting from an acoustic exposure depends on what the animal is doing at the time of the exposure and the type and magnitude of the response.

Disruption of feeding behavior can be difficult to correlate with anthropogenic sound exposure, so it is usually inferred by observed displacement from known foraging areas, the appearance of secondary indicators (*e.g.,* bubble nets or sediment plumes), or changes in dive behavior. As for other types of behavioral response, the frequency, duration, and temporal pattern of signal presentation, as well as differences in species sensitivity, are likely contributing factors to differences in response in any given circumstance (*e.g.,* Croll *et al.,* 2001; Nowacek *et al,.* 2004; Madsen *et al.,* 2006; Yazvenko *et al.,* 2007). A determination of whether foraging disruptions incur fitness consequences would require information on or estimates of the energetic requirements of the affected individuals and the relationship between prey availability, foraging effort and success, and the life history stage of the animal.

Variations in respiration naturally vary with different behaviors and alterations to breathing rate as a function of acoustic exposure can be expected to co-occur with other behavioral reactions, such as a flight response or an alteration in diving. However, respiration rates in and of themselves may be representative of annoyance or an acute stress response. Various studies have shown that respiration rates may either be unaffected or could increase, depending on the species and signal characteristics, again highlighting the importance in understanding species differences in the tolerance of underwater noise when determining the potential for impacts resulting from anthropogenic sound exposure (*e.g*., Kastelein *et al*., 2001, 2005, 2006; Gailey *et al*., 2007).

Marine mammals vocalize for different purposes and across multiple modes, such as whistling, echolocation click production, calling, and singing. Changes in vocalization behavior in response to anthropogenic noise can occur for any of these modes and may result from a need to compete with an increase in background noise or may reflect increased vigilance or a startle response. For example, in the presence of potentially masking signals, humpback whales and killer whales have been observed to increase the length of their songs (Miller *et al.,* 2000; Fristrup *et al.,* 2003; Foote *et al.,* 2004), while right whales (*Eubalaena glacialis*) have been observed to shift the frequency content of their calls upward while reducing the rate of calling in areas of increased anthropogenic noise (Parks *et al.,* 2007). In some cases, animals may cease sound production during production of aversive signals (Bowles *et al.,* 1994).

Avoidance is the displacement of an individual from an area or migration path as a result of the presence of a sound or other stressors, and is one of the most obvious manifestations of disturbance in marine mammals (Richardson *et al.,* 1995). For example, gray whales (*Eschrictius robustus*) are known to change direction – deflecting from customary migratory paths – in order to avoid noise from seismic surveys (Malme *et al.,* 1984). Avoidance may be short-term, with animals returning to the area once the noise has ceased (*e.g.*, Bowles *et al.,* 1994; Goold, 1996; Stone *et al.,* 2000; Morton and

Symonds, 2002; Gailey *et al.,* 2007). Longer-term displacement is possible, however, which may lead to changes in abundance or distribution patterns of the affected species in the affected region if habituation to the presence of the sound does not occur (*e.g.*, Blackwell *et al.,* 2004; Bejder *et al.,* 2006; Teilmann *et al.,* 2006).

A flight response is a dramatic change in normal movement to a directed and rapid movement away from the perceived location of a sound source. The flight response differs from other avoidance responses in the intensity of the response (*e.g.*, directed movement, rate of travel). Relatively little information on flight responses of marine mammals to anthropogenic signals exist, although observations of flight responses to the presence of predators have occurred (Connor and Heithaus, 1996; Bowers *et al*., 2018). The result of a flight response could range from brief, temporary exertion and displacement from the area where the signal provokes flight to, in extreme cases, marine mammal strandings (Evans and England, 2001). However, it should be noted that response to a perceived predator does not necessarily invoke flight (Ford and Reeves, 2008), and whether individuals are solitary or in groups may influence the response.

Behavioral disturbance can also impact marine mammals in more subtle ways. Increased vigilance may result in costs related to diversion of focus and attention (*i.e.*, when a response consists of increased vigilance, it may come at the cost of decreased attention to other critical behaviors such as foraging or resting). These effects have generally not been demonstrated for marine mammals, but studies involving fish and terrestrial animals have shown that increased vigilance may substantially reduce feeding rates (*e.g.*, Beauchamp and Livoreil, 1997; Fritz *et al.,* 2002; Purser and Radford, 2011). In addition, chronic disturbance can cause population declines through reduction of fitness (*e.g.*, decline in body condition) and subsequent reduction in reproductive success, survival, or both (*e.g.*, Harrington and Veitch, 1992; Daan *et al.,* 1996; Bradshaw *et al.,* 1998). However, Ridgway *et al.* (2006) reported that increased vigilance in bottlenose dolphins exposed to sound over a 5 day period did not cause any sleep deprivation or stress effects.

Many animals perform vital functions, such as feeding, resting, traveling, and socializing, on a diel cycle (24-hour cycle). Disruption of such functions resulting from reactions to stressors such as sound exposure are more likely to be significant if they last more than one diel cycle or recur on subsequent days (Southall *et al.,* 2007). Consequently, a behavioral response lasting less than one day and not recurring on subsequent days is not considered particularly severe unless it could directly affect reproduction or survival (Southall *et al.,* 2007). Note that there is a difference between multi-day substantive behavioral reactions and multi-day anthropogenic activities. For example, just because an activity lasts for multiple days does not necessarily mean that individual animals are either exposed to activity-related stressors for multiple days or, further, exposed in a manner resulting in sustained multi-day substantive behavioral responses.

Stress responses —An animal's perception of a threat may be sufficient to trigger stress responses consisting of some combination of behavioral responses, autonomic nervous system responses, neuroendocrine responses, or immune responses (*e.g.*, Seyle, 1950; Moberg, 2000). In many cases, an animal's first and sometimes most economical (in terms of energetic costs) response is behavioral avoidance of the potential stressor. Autonomic nervous system responses to stress typically involve changes in heart rate, blood pressure, and gastrointestinal activity. These responses have a relatively short duration and may or may not have a significant long-term effect on an animal's fitness.

Neuroendocrine stress responses often involve the hypothalamus-pituitary-adrenal system. Virtually all neuroendocrine functions that are affected by stress—including immune competence, reproduction, metabolism, and behavior—are regulated by pituitary hormones. Stress-induced changes in the secretion of pituitary hormones have been implicated in failed reproduction, altered metabolism, reduced immune competence, and behavioral disturbance (*e.g.*, Moberg, 1987; Blecha, 2000). Increases in the circulation of glucocorticoids are also equated with stress (Romano *et al.*, 2004).

The primary distinction between stress (which is adaptive and does not normally place an animal at risk) and "distress" is the cost of the response. During a stress response, an animal uses glycogen stores that can be quickly replenished once the stress is alleviated. In such circumstances, the cost of the stress response would not pose serious fitness consequences. However, when an animal does not have sufficient energy reserves to satisfy the energetic costs of a stress response, energy resources must be diverted from other functions. This state of distress will last until the animal replenishes its energetic reserves sufficient to restore normal function.

Relationships between these physiological mechanisms, animal behavior, and the costs of stress responses are well-studied through controlled experiments and for both laboratory and free-ranging animals (*e.g.*, Holberton *et al.,* 1996; Hood *et al.,* 1998; Jessop *et al.,* 2003; Krausman *et al.,* 2004; Lankford *et al.,* 2005). Stress responses due to exposure to anthropogenic sounds or other stressors and their effects on marine mammals have also been reviewed (Fair and Becker, 2000; Romano *et al.,* 2002b) and, more rarely, studied in wild populations (*e.g.*, Romano *et al.,* 2002a). For example, Rolland *et al.* (2012) found that noise reduction from reduced ship traffic in the Bay of Fundy was associated with decreased stress in North Atlantic right whales. These and other studies lead to a reasonable expectation that some marine mammals will experience physiological stress responses upon exposure to acoustic stressors and that it is possible that some of these would be classified as "distress." In addition, any animal experiencing TTS would likely also experience stress responses (NRC, 2003), however distress is an unlikely result of this project based on observations of marine mammals during previous, similar construction projects.

Auditory Masking— Acoustic masking is when other noises such as from human sources interfere with animal detection of acoustic signals such as communication calls, echolocation sounds, and environmental sounds important to marine mammals. Since many marine mammals rely on sound to find prey, moderate social interactions, and facilitate mating (Tyack, 2008), noise from anthropogenic sound sources can interfere with these functions, but only if the noise spectrum overlaps with the hearing sensitivity of the marine mammal and the sounds being used (Southall *et al.,* 2007; Clark *et al.,* 2009; Hatch *et al.,* 2012). Chronic exposure to excessive, though not high-intensity, noise could cause masking at particular frequencies for marine mammals that utilize sound for vital biological functions (Clark *et al.,* 2009). The ability of a noise source to mask biologically important sounds depends on the characteristics of both the noise source and the signal of interest (*e.g.,* signal-to-noise ratio, temporal variability, direction), in relation to each other and to an animal's hearing abilities (*e.g.*, sensitivity, frequency range, critical ratios, frequency discrimination, directional discrimination, age or TTS hearing loss), and existing ambient noise and propagation conditions. It is important to distinguish TTS and PTS, which persist after the sound exposure, from masking, which occurs during the sound exposure. Because masking (without resulting in TS) is not associated with abnormal physiological function, but rather changes in behavioral patterns resulting from lost opportunities (*e.g.*, communication, feeding), it is not considered a physiological effect, but rather a potential behavioral effect.

The frequency range of the potentially masking sound is important in determining any potential behavioral impacts. For example, low-frequency signals may have less effect on high-frequency echolocation sounds produced by odontocetes but are more likely to affect detection of mysticete communication calls and other potentially important natural sounds such as those produced by surf and some prey species. The masking of communication signals by anthropogenic noise may be considered as a reduction in the communication space of animals (*e.g.*, Clark *et al*., 2009) and may result in energetic or other costs as animals change their vocalization behavior (*e.g.*, Miller *et al*., 2000; Foote *et al*., 2004; Parks *et al*., 2007; Di Iorio and Clark, 2009; Holt *et al*., 2009). Masking can be reduced in situations where the signal and noise come from different directions (Richardson *et al*., 1995), through amplitude modulation of the signal, or through other compensatory behaviors (Houser and Moore, 2014). Masking can be tested directly in captive species (*e.g.*, Erbe, 2008), but in wild populations it must be either modeled or inferred from evidence of masking compensation. There are few studies addressing real-world masking sounds likely to be experienced by marine mammals in the wild (*e.g.*, Branstetter *et al*., 2013).

Marine mammals in Port Hueneme are continuously exposed to anthropogenic noise which may lead to some habituation, but is also a source of masking. Vocalization changes may result from a need to compete with an increase in background noise and include increasing the source level, modifying the frequency, increasing the call repetition rate of vocalizations, or ceasing to vocalize in the presence of increased noise (Hotchkin and Parks, 2013). Pinnipeds may be at risk for vocal masking.

Masking is more likely to occur in the presence of broadband, relatively continuous noise sources. Energy distribution of pile driving covers a broad frequency spectrum, and sound from pile driving would be within the audible range of California sea lions and harbor seals present in the proposed action area. While some pile driving during Navy training activities may mask some acoustic signals that are relevant to the daily behavior of pinnipeds, the short-term duration and limited areas affected make it very unlikely that the fitness or survival of any individuals would be affected.

Airborne Acoustic Effects—Pinnipeds that occur near the project site could be exposed to airborne sounds associated with pile driving and removal that have the potential to cause behavioral harassment, depending on their distance from these activities. Airborne noise would primarily be an issue for pinnipeds that are swimming or hauled out near the project site within the range of noise levels elevated above the acoustic criteria. We recognize that pinnipeds in the water could be exposed to airborne sound that may result in behavioral harassment when looking with their heads above water. Most likely, airborne sound would cause behavioral responses similar to those discussed above in relation to underwater sound. For instance, anthropogenic sound could cause hauled-out pinnipeds to exhibit changes in their normal behavior, such as reduction in vocalizations, or cause them to temporarily abandon the area and move further from the source. However, these animals would previously have been `taken' because of exposure to underwater sound above the behavioral harassment thresholds, which are in all cases larger than those associated with airborne sound. Thus, the behavioral harassment of these animals is already accounted for in these estimates of potential take. Therefore, we do not believe that authorization of incidental take resulting from airborne sound for pinnipeds is warranted, and airborne sound is not discussed further here.

Potential Effects on Marine Mammal Habitat

The Navy's proposed activities at the project area would not result in permanent negative impacts to habitats used directly by marine mammals, but may have potential short-term impacts to food sources such as forage fish and invertebrates and may affect acoustic habitat (see masking discussion above). Physical alteration of the water column or bottom topography, as a result of pile driving training exercises would be of limited duration and intermittent spatial and temporal scale. Considering that all piles would be removed after each training exercise is completed, long term or permanent impacts would be unlikely. Pile driving would likely result in localized turbidity increases, which would not be expected to decrease water quality due to the existing high use of Port Hueneme Harbor by the Navy and Oxnard Harbor District. Port Hueneme Harbor moves over 8 billion dollars annually, and is the only commercial deep-water port between Los

Angeles and San Francisco (Port of Hueneme, 2019). Additionally, the U.S. Army Corps of Engineers completed a port deepening project in 2021, dredging the commercial harbor to reach a depth of 12 m (40 ft) for berthings (Port of Hueneme, 2021). Given the highly industrial nature of the proposed action area, and likely existing elevated turbidity due to run-off, hardened shorelines, and vessel traffic, the incremental increase in turbidity resulting from the proposed training exercises would not have a measurable impact on physical habitat. No permanent structures would be installed in the proposed action area. No permanent impacts to habitat are proposed for, or would occur as a result of, these proposed training exercises. Therefore, Navy training activities are not likely to have more than a localized and short-term effect on marine mammal habitat in the proposed action area.

There are no known foraging hotspots or other ocean bottom structure of significant biological importance to marine mammals present in the marine waters of the project area. The Navy's training exercises in NBCV could have localized, temporary impacts on marine mammal habitat and their prey by increasing in-water sound pressure levels and slightly decreasing water quality. Increased noise levels may affect acoustic habitat (see masking discussion above) and adversely affect marine mammal prey in the vicinity of the project area (see discussion below). During impact and vibratory pile driving or removal, elevated levels of underwater noise would ensonify a portion of NBVC and nearby waters where both fishes and mammals occur and could affect foraging success. Additionally, marine mammals may avoid the area during construction, however, displacement due to noise is expected to be temporary and is not expected to result in long-term effects to the individuals or populations. Construction activities are of short duration and would likely have temporary impacts on marine mammal habitat through increases in underwater and airborne sound.

Pile installation/removal may temporarily increase turbidity resulting from suspended sediments. Any increases would be temporary, localized, and minimal. In general, turbidity associated with pile installation is localized to about a 7.6-m (25-ft) radius around the pile (Everitt *et al.*, 1980). Cetaceans are not expected to be close enough to the project pile driving areas to experience effects of turbidity, and pinnipeds could avoid localized areas of turbidity. Therefore, the impact from increased turbidity levels is expected to minimal for marine mammals. Furthermore, pile driving and removal at the project site would not obstruct movements or migration of marine mammals.

Potential Pile Driving Effects on Prey — Pile driving produces continuous, non-impulsive sounds (*i.e.,* vibratory pile driving) and intermittent, pulsed sounds (*i.e.* impact driving). Sound may affect marine mammals through impacts on the abundance, behavior, or distribution of prey species (*e.g.*, crustaceans, cephalopods, fish, zooplankton). Marine mammal prey varies by species, season, and location. Here, we describe studies regarding the effects of noise on known marine mammal prey.

Marine invertebrates in the proposed action area encompass a diverse range of species, including mollusks, crabs, shrimp, snails, sponges, sea fans, isopods, and a diverse assemblage of polychaete worms (Chess and Hobson, 1997; Dugan *et al*., 2000; Proctor *et al.*, 1980; Talley *et al*., 2000; Thompson *et al*., 1993). Marine invertebrates are important food sources that support the base of the regional food chain (Linacre, 2004; Perry, 2003) and provide food for both harbor seals, which feed on crustaceans and shellfish, as well as California sea lions, which feed on squid. The benthic habitat within the proposed action area is predominantly soft bottomed, and heavily impacted by anthropogenic use (*e.g.*, by maintenance dredging).

Very little is known about sound detection by aquatic invertebrates (Hawkins and Popper, 2017; Lovell *et al.*, 2005; Popper, 2008). While data are limited, studies do suggest that most major invertebrates do not hear well, and crustaceans and cephalopods likely hear only low frequency sounds (Hanlon, 1987; Hill, 2009; Mooney *et al*., 2010; Offutt, 1970; Roberts and Breithaupt, 2016). Acoustic signals produced by crustaceans range from low-frequency rumbles (20 to 60 Hz) to high-frequency signals 20 to 55 kHz (Edmonds *et al.*, 2016; Henninger and Watson, 2005; Patek and Caldwell, 2006; Roberts and Breithaupt, 2016; Staaterman, 2016). In general, organisms may detect sound by sensing either the particle motion or pressure component of sound, or both. However, because any acoustic sensory capabilities of invertebrates (if present at all) are limited to detecting water motion, and water particle motion near a sound source falls off rapidly with distance, aquatic invertebrates are likely limited to detecting nearby low-frequency sound sources rather than sound caused by pressure waves from distant sources unknown (Hawkins and Popper, 2017; Lovell *et al*., 2005; Popper, 2008). Recent research suggests that both behavioral and physiological impacts may be possible when crustaceans are exposed to repeated high levels of low frequency, high amplitude anthropogenic noise (Celi *et al.*, 2015; Edmonds *et al.*, 2016; Filiciotto *et al.*, 2014; Roberts and Breithaupt, 2016). With respect specifically to pile driving, the substrate borne vibrations can elicit alarm responses in mobile benthic epifauna such as crabs, while particle motion in the water column elicits a similar response in squid. While benthic invertebrates of many types would be expected in the proposed action area, squid would not be common (Jones *et al.*, 2020; Roberts *et al*., 2016).

It is expected that most marine invertebrates would be sensitive to the low frequency, high amplitude sources, particularly impact pile driving, associated with the proposed training exercises, as alarm response to simulated pile driving has been observed in mollusks, crustaceans, and cephalopods (Jones *et al*., 2020; Roberts *et al.*, 2016). Any marine invertebrate capable of sensing sound may alter its behavior if exposed to sufficiently high levels of sound. Although individuals may be briefly exposed to pile driving noise associated with the proposed training exercises, intermittent exposures to pile driving noise are not expected to impact survival, growth, recruitment, or reproduction of widespread marine invertebrate populations, particularly given that invertebrate populations living within this highly industrialized environment are likely acclimated to fairly high levels of background noise. Therefore, impacts to invertebrates are expected to be minor and temporary.

The nearshore areas of Port Hueneme are highly industrialized, and thus, represent relatively low quality fish habitat. Nevertheless, this area is inhabited by a range of pelagic and demersal fish species, many of which represent important forage species (Allen *et al.*, 2006; Cross and Allen, 1993; Mueter, 2004). Small coastal pelagic fishes, such as the pacific sardine and northern anchovy, are important forage species for marine mammals, as are larger piscivorous species including mackerel, kelp bass (*Paralabrax clathratus*), and rockfish, which are also preyed upon by marine mammals (Koslow *et al*., 2015; Miller and Lea, 1972; Roedel, 1953).

Fish utilize the soundscape and components of sound in their environment to perform important functions such as foraging, predator avoidance, mating, and spawning (*e.g.*, Zelick and Mann, 1999; Fay, 2009). All fishes have two sensory systems that can detect sound in the water: the inner ear, which functions similarly to the inner ear in other vertebrates, and the lateral line, which consists of a series of receptors along the body of a fish (Popper and Hawkins, 2018; Popper and Schilt, 2008). The lateral line detects particle motion at low frequencies from below 1 Hz up to at least 400 Hz (Coombs and Montgomery, 1999; Hastings and Popper, 2005; Higgs and Radford, 2013; Webb *et al.,* 2008). The inner ear of fish generally detects relatively higher frequency sounds. The potential effects of noise on fishes depends on the overlapping frequency range, distance from the sound source, water depth of exposure, and species-specific hearing sensitivity, anatomy, and physiology. Key impacts to fishes may include behavioral responses, hearing damage, barotrauma (pressure-related injuries), and mortality.

All known fish species would be able to detect low-frequency noise associated with the proposed training exercises. Although hearing capability data only exist for fewer than 100 fish species, current data suggest that most fish detect sounds from 50 to 1,000 Hz (Hawkins and Popper, 2017; Popper, 2008; Popper *et al*., 2003; Popper *et al.*, 2014). It is believed that most fish have their best hearing sensitivity from 100 to 400 Hz (Hawkins and Popper, 2017; Popper, 2008).

SPLs of sufficient strength have been known to cause injury to fish and fish mortality (summarized in Popper *et al*., 2014). However, in most fish species, hair cells in the ear continuously regenerate and loss of auditory function likely is restored when damaged cells are replaced with new cells. As a consequence, any hearing loss in fish may be as temporary as the timeframe required to repair or replace the sensory cells that were damaged or destroyed (Smith *et al.,* 2006). Halvorsen *et al.* (2012a) showed that a TTS of 4-6 dB was recoverable within 24 hours for one species. Impacts would be most severe when the individual fish is close to the source and when the duration of exposure is long. Injury caused by barotrauma can range from slight to severe and can cause death, and is most likely for fish with swim bladders. Barotrauma injuries have been documented during controlled exposure to impact pile driving (Halvorsen *et al.,* 2012b; Casper *et al.,* 2013). PTS has not been documented in fish.

Fish react to sounds that are especially strong and/or intermittent low-frequency sounds. Short duration, sharp sounds can cause overt or subtle changes in fish behavior and local distribution. The reaction of fish to noise depends on the physiological state of the fish, past exposures, motivation (*e.g.*, feeding, spawning, migration), and other environmental factors. Hastings and Popper (2005) identified several studies that suggest fish may relocate to avoid certain areas of sound energy. Additional studies have documented effects of pile driving on fish; several are based on studies in support of large, multiyear bridge construction projects (*e.g.,* Scholik and Yan 2001, 2002; Popper and Hastings 2009). Several studies have demonstrated that impulse sounds might affect the distribution and behavior of some fishes, potentially impacting foraging opportunities or increasing energetic costs (*e.g.*, Fewtrell and McCauley, 2012; Pearson *et al.* 1992; Skalski *et al.* 1992; Santulli *et al.* 1999; Paxton *et al.* 2017). However, some studies have shown no or slight reaction to impulse sounds (*e.g.*, Pena *et al.* 2013; Wardle *et al.* 2001; Jorgenson and Gyselman, 2009; Cott *et al.* 2012).

Since the proposed action area is a relatively enclosed environment, sound would not propagate outside of Port Hueneme Harbor. Furthermore, only a limited number of fish may be exposed to loud sound, while most would be far enough from the sources for the sound level to have attenuated considerably. During a period of disrupted hearing, fish would potentially be less sensitive to sounds produced by predators or prey, or to other acoustic information about their environment. Fish use sounds to detect both predators and prey, as well as for schooling, mating, and navigating (Hawkins and Popper, 2017; Popper *et al*., 2003). Masking can impede the flight response of fish from predators or may not allow fish to detect potential prey in the area. Long-term consequences to fish species are not expected, as any masking would be localized and short term.

Behavioral responses to loud noise could include a startle response, such as the fish swimming away from the source, the fish "freezing" and staying in place, or scattering (Popper, 2008). It is not anticipated that temporary behavioral reactions (*e.g.,* temporary cessation of feeding or avoidance response) would affect the individual fitness of a fish, or a population as individuals are expected to resume normal behavior following the sound exposure. In general, impacts to marine mammal prey species are expected to be minor and temporary due to the short timeframe of the project.

In summary, given the short daily duration of sound associated with individual pile driving and the small area being affected relative to available nearby habitat, pile driving activities associated with the proposed action are not likely to have a permanent, adverse effect on any fish habitat, or populations of fish species or other prey. Thus, we conclude that impacts of the specified activity are not likely to have more than short-term adverse effects on any prey habitat or populations of prey species. Further, any impacts to marine mammal habitat are not expected to result in significant or long-term consequences for individual marine mammals, or to contribute to adverse impacts on their populations.

Estimated Take

This section provides an estimate of the number of incidental takes proposed for authorization through this IHA, which will inform both NMFS' consideration of "small numbers" and the negligible impact determinations.

Harassment is the only type of take expected to result from these activities. For this military readiness activity, the MMPA defines "harassment" as (i) Any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) Any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering, to a point where the behavioral patterns are abandoned or significantly altered (Level B harassment).

Authorized takes would be by Level B harassment only, in the form of disruption of behavioral patterns and/or TTS for individual marine mammals resulting from exposure to the pile driving activities. Based on the nature of the activity and the anticipated effectiveness of the mitigation measures (*i.e.*, shutdown measures) discussed in detail below in the **Proposed Mitigation** section, Level A harassment is neither anticipated nor proposed to be authorized.

As described previously, no serious injury or mortality is anticipated or proposed to be authorized for this activity. Below we describe how the proposed take numbers are estimated.

For acoustic impacts, generally speaking, we estimate take by considering: (1) acoustic thresholds above which NMFS believes the best available science indicates marine mammals will be behaviorally harassed or incur some degree of permanent hearing impairment; (2) the area or volume of water that will be ensonified above these levels in a day; (3) the density or occurrence of marine mammals within these ensonified areas; and, (4) the number of days of activities. We note that while these factors can contribute to a basic calculation to provide an initial prediction of potential takes, additional information that can qualitatively inform take estimates is also sometimes available (*e.g.,* previous monitoring results or average group size). Below, we describe the factors considered here in more detail and present the proposed take estimates.

Acoustic Thresholds

NMFS recommends the use of acoustic thresholds that identify the received level of underwater sound above which exposed marine mammals would be reasonably expected to be behaviorally harassed (equated to Level B harassment) or to incur PTS of some degree (equated to Level A harassment).

Level B Harassment – Though significantly driven by received level, the onset of behavioral disturbance from anthropogenic noise exposure is also informed to varying degrees by other factors related to the source or exposure context (*e.g.*, frequency, predictability, duty cycle, duration of the exposure, signal-to-noise ratio, distance to the source), the environment (*e.g.*, bathymetry, other noises in the area, predators in the area), and the receiving animals (hearing, motivation, experience, demography, life stage, depth) and can be difficult to predict (*e.g.*, Southall *et al.,* 2007, 2021, Ellison *et al.*, 2012). Based on what the available science indicates and the practical need to use a threshold based on a metric that is both predictable and measurable for most activities, NMFS typically uses a generalized acoustic threshold based on received level to estimate the onset of behavioral harassment. NMFS generally predicts that marine mammals are likely to be behaviorally harassed in a manner considered to be Level B harassment when exposed to underwater anthropogenic noise above root-mean-squared pressure received levels (RMS SPL) of 120 dB (referenced to 1 micropascal (re 1 μPa)) for continuous (*e.g.,* vibratory pile-driving, drilling) and above RMS SPL 160 dB re 1 μPa for non-explosive impulsive (*e.g.*, seismic airguns) or intermittent (*e.g.*, scientific sonar) sources.

The Navy's proposed training activities includes the use of continuous (vibratory pile installation/removal) and impulsive (impact pile installation) sources, and therefore the RMS SPL thresholds of 120 and 160 dB re 1 μPa are applicable.

Level A harassment – NMFS' Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0) (Technical Guidance, 2018) identifies dual criteria to assess auditory injury (Level A harassment) to five different marine mammal groups (based on hearing sensitivity) as a result of exposure to noise from two different types of sources (impulsive or non-impulsive). The Navy's training exercises includes the use of impulsive (impact pile driving) and non-impulsive (vibratory pile driving/removal) sources.

These thresholds are provided in Table 4. The references, analysis, and methodology used in the development of the thresholds are described in NMFS' 2018 Technical Guidance, which may be accessed at: *www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance*.

Table 4. Thresholds Identifying the Onset of Permanent Threshold Shift

	PTS Onset Thresholds* (Received Level)	
Hearing Group	Impulsive	Non-impulsive
Low-Frequency (LF) Cetaceans	*Cell 1* $L_{p,\text{0-pk,flat}}$: 219 dB $L_{\text{E},p,\text{ LF,24h}}$: 1183 dB	*Cell 2* $L_{\text{E},p,\text{ LF,24h}}$: 199 dB
Mid-Frequency (MF) Cetaceans	*Cell 3* $L_{p,\text{0-pk,flat}}$: 230 dB $L_{\text{E},p,\text{ MF,24h}}$: 1185 dB	*Cell 4* $L_{\text{E},p,\text{ MF,24h}}$: 198 dB
High-Frequency (HF) Cetaceans	*Cell 5* $L_{p,\text{0-pk,flat}}$: 202 dB $L_{\text{E},p,\text{HF,24h}}$: 155 dB	*Cell 6* $L_{\text{E},p,\text{ HF,24h}}$: 173 dB
Phocid Pinnipeds (PW) (Underwater)	*Cell 7* $L_{p,\text{0-pk.flat}}$: 218 dB $L_{\text{E},p,\text{PW,24h}}$: 1185 dB	*Cell 8* $L_{\text{E},p,\text{PW,24h}}$: 201 dB
Otariid Pinnipeds (OW) (Underwater)	*Cell 9* $L_{p,\text{0-pk,flat}}$: 232 dB $L_{\text{E},p,\text{OW,24h}}$: 203 dB	*Cell 10* $L_{\text{E},p,\text{OW,24h}}$: 219 dB

* Dual metric thresholds for impulsive sounds: Use whichever results in the largest isopleth for calculating PTS onset. If a non-impulsive sound has the potential of exceeding the peak sound pressure level thresholds associated with impulsive sounds, these thresholds are recommended for consideration. Note: Peak sound pressure level ($L_{p,\text{0-pk}}$) has a reference value of 1 μPa, and weighted cumulative sound exposure level ($L_{\text{E},p}$) has a reference value of 1μPa²s. In this Table, thresholds are abbreviated to be more reflective of International Organization for Standardization standards (ISO 2017). The subscript “flat” is being included to indicate peak sound pressure are flat weighted or unweighted within the generalized hearing range of marine mammals (*i.e.*, 7 Hz to 160 kHz). The subscript associated with cumulative sound exposure level thresholds indicates the designated marine mammal auditory weighting function (LF, MF, and HF cetaceans, and PW and OW pinnipeds) and that the recommended accumulation period is 24 hours. The weighted cumulative sound exposure level thresholds could be exceeded in a multitude of ways (*i.e.*, varying exposure levels and durations, duty cycle). When possible, it is valuable for action proponents to indicate the conditions under which these thresholds will be exceeded.

Ensonified Area

Here, we describe operational and environmental parameters of the activity that are used in estimating the area ensonified above the acoustic thresholds, including source levels and transmission loss coefficient.

Sound Source Levels of Proposed Training Exercises – The intensity of pile driving sounds is greatly influenced by factors such as the type of piles, hammers, and the physical environment in which the activity takes place. The Navy evaluated sound source level measurements available for certain pile types and sizes from similar environments to determine reasonable source levels likely to result from the proposed pile driving activities. The Navy determined that data from CALTRANS (2020) and NAVFAC SW (2020) provided the most applicable acoustic source data to use as proxy source levels for this proposed action. The Navy proposed, and NFMS agrees, that source level data from NAVFAC SW (2020) be used as proxy source levels for vibratory driving of 24-inch sheet piles because this reference provided noise data from the site of the proposed training exercise (*i.e.*, data were recorded from Wharf 4 at NBVC). The Navy proposes, and NMFS agrees, that source level data from CALTRANS (2020) be used for all other pile sizes and installation methods as this reference provided data for the same or similar pile sizes and installation techniques, despite source levels having been recorded at different locations than the proposed training exercises (Table 5). Details are described below. Note that the source levels discussed here and provided in Table 5 represent the SPL referenced at a distance of 10 m from the source unless otherwise specified. Further, the Navy and NMFS assume that source levels attributed to vibratory removal of piles are equivalent or less than source levels attributed to the vibratory installation of pile.

Vibratory or impact data is not available for 16-inch timber piles. Therefore, the Navy proposed, and NMFS agrees, that source levels for impact driving of 14-inch timber piles at the Ballena Bay in Alameda, California be used as a proxy values for impact driving 16-inch timber piles (CALTRANS, 2020) (Table 5). For vibratory driving of 16-inch timber piles, the Navy proposed, and NMFS concurs, to use source level data from vibratory driving of unknown sized timber piles used at the Norfolk Naval Station in Norfolk, Virginia (CALTRANS, 2020; Illingworth & Rodkin, 2015) as proxy values for the proposed training exercises (Table 5).

Source level data for the installation and removal of 14-inch steel H-beam piles is limited. The Navy proposed, and NMFS agrees, that source levels for 15-inch steel H-been piles installed at Ballena Isle Marina in Alameda, California be used as proxy values for 14-inch steel H-beam piles during impact driving. This decision is based upon the piles similar size, the use of a vertical hammer placement (as opposed to battering at an angle), and the similarity in water depths at the action sites (Table 5). The Navy also proposed, and NMFS agrees, that source levels for 10-inch steel H-beam piles installed during the San Rafeal Canal project in San Rafeal, California (CALTRANS, 2020) be used as proxy values for vibratory driving of 14-inch steel H beam piles during vibratory driving (Table 5).

Table 5. Summary of Unattenuated In-water Pile Driving Source Levels

Pile Driving Method	Pile Description	Peak SPL (dB re 1 µPa)	RMS SPL (dB re 1 µPa)	SEL_{ss} (dB re 1 µPa^2 sec)
Impact	Timber (16-in)	180	170	160
	Steel H beam (14-in)	195	180	170
Vibratory (installation and removal)	Timber (16-in)	-	162	-
	Steel sheet (24-in)	-	159[1]	-
	Steel H beam (14-in)	-	147	-

[1]The RMS SPL for vibratory installation of 24-inch steel sheets was recorded 11 m from the source.

Level B Harassment Zones – Transmission loss (TL) is the decrease in acoustic intensity as an acoustic pressure wave propagates out from a source. TL parameters vary with frequency, temperature, sea conditions, current, source and receiver depth, water depth, water chemistry, and bottom composition and topography. The general formula for underwater TL is:

TL = B * log10 (R1/R2),

Where:

B = transmission loss coefficient (assumed to be 15)

R1 = the distance of the modeled SPL from the driven pile, and

R2 = the distance from the driven pile of the initial measurement.

This formula neglects loss due to scattering and absorption, which is assumed to be zero here. The degree to which underwater sound propagates away from a sound source is dependent on a variety of factors, most notably the water bathymetry and presence or absence of reflective or absorptive conditions including in-water structures and sediments. The recommended TL coefficient for most nearshore environments is the practical spreading value of 15. This value results in an expected propagation environment that would lie between spherical and cylindrical spreading loss conditions, which is the most appropriate assumption for the Navy's proposed training exercises in the absence of specific modelling.

All Level B harassment isopleths are reported in Table 7 considering RMS SSLs for impact and vibratory pile driving, respectively. It should be noted that based on the geography of the NBVC and the surrounding land masses, port infrastructure, and the shoreline, the Level B harassment isopleths would reach a maximum of 790 m (2,592 ft) for Wharf 4 South, 795 m (2,601 ft) for Wharf 4 East, and 655 m (2,149 ft) for Wharf D (See Figure 6-1, 6-2, and 6-3 in the Navy's application). Although it is known that there can be leakage or diffraction around such barriers, the assumption herein is that any impervious barriers would contain all pile driving noise associated with the Proposed Action.

Level A Harassment Zones – The ensonified area associated with Level A harassment is more technically challenging to predict due to the need to account for a duration component. Therefore, NMFS developed an optional User Spreadsheet tool to accompany the Technical Guidance that can be used to relatively simply predict an isopleth distance for use in conjunction with marine mammal density or occurrence to help predict potential takes. We note that because of some of the assumptions included in the methods underlying this optional tool, we anticipate that the resulting isopleth estimates are typically going to be overestimates of some degree, which may result in an overestimate of potential take by Level A harassment. However, this optional tool offers the best way to estimate isopleth distances when more sophisticated modeling methods are not available or practical. For stationary sources, such as vibratory and impact pile driving, the optional User Spreadsheet tool predicts the distance at which, if a marine mammal remained at that distance for the duration of the activity, it would be expected to incur PTS. Inputs used in the optional User Spreadsheet tool are reported in Table 6, and the resulting estimated isopleths are reported in Table 7.

Table 6. NMFS User Spreadsheet Inputs

	Vibratory Pile Driving			Impact Pile Driving	
	16-inch Timber Piles	14-inch Steel H Beam	24-inch Steel Sheet	16-inch Timber Piles	14-inch Steel H Beam
Spreadsheet Tab Used	A.1) Non-Impul, Stat, Cont.	A.1) Non-Impul, Stat, Cont.	A.1) Non-Impul, Stat, Cont.	E.1) Impact pile driving	E.1) Impact pile driving
Source Level (SPL)	162 dB RMS	147 dB RMS	159 dB RMS	160 dB SEL	170 dB SEL
Transmission Loss Coefficient	15	15	15	15	15
Weighting Factor Adjustment (kHz)	2.5	2.5	2.5	2	2
Time to install / remove single pile (minutes)	30	30	20	--	--
Number of strikes per pile	--	--	--	1800	1800
Piles to install / remove per day	2	2	3	2	2
Distance of sound pressure level measurement (m)	10	10	11	10	10

Table 7. Distances to Level A Harassment, by Hearing Group, and Level B Harassment Thresholds Per Pile Type and Pile Driving Method

Activity	Pile Description	Piles per day	Level A harassment distance (m)		Level A harassment areas (km²) for all hearing groups[1]	Level B harassment distance (m) all hearing groups	Level B harassment areas (km²) for all hearing groups[1]
			PW	OW			
Vibratory Installation / Removal	16-inch Timber Piles	3	4.8	0.3	< 0.1	6,310[2]	< 0.3
	14-inch Steel H Beam	2	0.5	0	< 0.1	631	< 0.3
	24-inch Steel Sheet	3	3.4	0.2	< 0.1	4,379[2]	< 0.3
Impact Installation / Removal	16-inch Timber Piles	3	36.8	2.7	< 0.1	47	< 0.1
	14-inch Steel H-Beam	2	170.6	12.4	< 0.1	216	< 0.1

[1]Harassment areas have been truncated where appropriate to account for land masses.
[2]The maximum harassment distances are approximately 790 m (2,592 ft) for Wharf 4 South, 795 m (2,601 ft) for Wharf 4 East, and 655 m (2,149 ft) for Wharf D.

Marine Mammal Occurrence and Take Estimation

In this section we provide information about the occurrence of marine mammals, including density or other relevant information that will inform the take calculations. Here we also describe how the occurrence information provided is synthesized to produce a quantitative estimate of the take that is reasonably likely to occur and proposed for authorization.

California Sea Lion

No density or abundance numbers exist for California sea lions in the proposed action area. Therefore, to quantitatively assess exposure of marine mammals to noise from pile driving conducted as part of the Navy's training exercises, the Navy used estimates derived from recent monitoring efforts to determine the number of animals potentially exposed in the Level A and Level B harassment zones in any one day of pile driving or extraction.

NBVC biologists have been conducting opportunistic surveys of California sea lions hauled out at Wharf D somewhat regularly since 2010. California sea lions have been observed regularly hauling out on structures (*i.e.*, docks, barges, and boats) near Wharf D, sometimes in large numbers. They often crowd onto these structures, making it difficult for observers to determine the total number of sea lions present. Some of the counts at Wharf D include pinnipeds present in the water, which could also include harbor seals. California sea lions are the predominant pinniped species at Port Hueneme Harbor, so the assumption is that nearly all animals present would be California sea lions. The number of California sea lions present in the proposed action area at Wharf D is variable by month and by year. The maximum number of California sea lions counted at Wharf D during an individual survey day was 342 (1/15/2021). No other pinniped species have been observed at Wharf D during these surveys. While these count data provide a snapshot of pinniped presence in the action area, they do not provide rate of turnover over time of different pinnipeds present in the proposed action area; nor do they provide long-term sea lion presence patterns.

Since the fall of 2020, there have also been efforts to count pinnipeds in the water near Wharf 4; however, these monitoring efforts have been sporadic, taking place for an hour at a time from a boat launch just south of Wharf 4. Monitoring efforts have observed anywhere from zero to 85 sea lions in an hour (see Figure 6-4 in the Navy's application). Additionally, the same individuals may have been observed multiple times within the survey period. Therefore, the number of California sea lions assumed to be present in the proposed action area at Wharf 4 is variable.

Based on these data, the Navy conservatively estimates that 342 California sea lions (*i.e.*, the maximum number of California sea lions observed in the proposed action area on a single day) may be present in the proposed action area each day and be behaviorally harassed during the 96 days of pile driving proposed as part of the Navy's training exercises. Therefore, the Navy requests, and NMFS proposes to authorize, 36,960 instances of take by Level B harassment for California Sea Lions. No take Level A harassment is anticipated or proposed to be authorized for California sea lions due to the small Level A harassment zones (Table 7) and implementation of shutdown zones, which would be larger than Level A harassment isopleths, as described below in the **Proposed Mitigation** section.

Harbor Seals

No density or abundance numbers exist for harbor seals in the proposed action area. Harbor seals have only been observed by NBVC biologists near Wharf 4; no harbor seals have been detected at Wharf D. The maximum number of harbor seals seen over the course of an hour of observation was 5 seals. This was 5.88% of the maximum number of California sea lions observed at Wharf D (N = 85). Therefore, to account for the potential for harbor seals in the proposed action area, the Navy assumes that 5.88 percent of the maximum number of California sea lions observed animals at Wharf D (5.88 percent of 342, or 20.1 [rounded up to 21] animals per day) are harbor seals.

Based on these data, the Navy conservatively estimates that 21 harbor seals may be present in the proposed action area each day and be behaviorally harassed during the 96 days of pile driving proposed as part of the Navy's training exercises. Therefore, the Navy requests, and NMFS proposes to authorize, 2,016 instances of take by Level B harassment for harbor seals. No take by Level A harassment is anticipated or proposed to be authorized for harbor seals. While the Level A harassment zone for impact pile driving 14-inch steel H-beams is 170.6 m, harbor seals are considered rare in the proposed action area (Department of the Navy, 2019) minimizing the likelihood of Level A harassment take. In addition, measures described below in the **Proposed Mitigation** section, including shutdown measures and the implementation of lookouts at stations where the entire Level B zones are observable, will minimize the likelihood that harbor seals will be in this larger zone during impact driving of steel H-beams and that they would incur PTS before pile driving activities could be shut down. Therefore NMFS agrees with the Navy and is not proposing to authorize any takes by Level A harassment takes for harbor seals during the Navy's proposed training exercises.

In summary, the total amount of Level A harassment and Level B harassment proposed to be authorized for each marine mammal stock is presented in Table 8.

Table 8. Proposed Amount of Take as a Percentage of Stock Abundance, by Stock and Harassment Type

		Proposed Authorized Take			
Species	Stock	Level A	Level B	Total	Percent of Stock
California Sea Lion	U.S.	0	36,960	36,960	14.3
Harbor Seal	California	0	2,016	2,016	6.51

Proposed Mitigation

In order to issue an IHA under section 101(a)(5)(D) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to the activity, and other means of effecting the least practicable impact on the species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of the species or stock for taking for certain subsistence uses (latter not applicable for this action). NMFS regulations require applicants for incidental take authorizations to include information about the availability and feasibility (economic and technological) of equipment, methods, and manner of conducting the activity or other means of effecting the least practicable adverse impact upon the affected species or stocks, and their habitat (50 CFR 216.104(a)(11)).

In evaluating how mitigation may or may not be appropriate to ensure the least practicable adverse impact on species or stocks and their habitat, as well as subsistence uses where applicable, NMFS considers two primary factors:

(1) The manner in which, and the degree to which, the successful implementation of the measure(s) is expected to reduce impacts to marine mammals, marine mammal species or stocks, and their habitat. This considers the nature of the potential adverse impact being mitigated (likelihood, scope, range). It further considers the likelihood that the measure will be effective if implemented (probability of accomplishing the mitigating result if implemented as planned), the likelihood of effective implementation (probability implemented as planned), and;

(2) The practicability of the measures for applicant implementation, which may consider such things as cost, impact on operations, and, in the case of a military readiness activity, personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

The Navy must employ the following standard mitigation measures, as included in the proposed IHA:

- Conduct briefings between construction supervisors and crews, the marine mammal monitoring team, and Navy staff prior to the start of all in-water pile driving activity, and when new personnel join the work, to ensure that responsibilities, communication procedures, marine mammal monitoring protocols, and operational procedures are clearly understood.

- During all in-water work other than pile driving (*e.g.*, pile placement, boat use), in order to prevent injury from physical interaction with construction equipment, a shutdown zone of 10 m (33 ft) will be implemented. If a marine mammal comes within 10 m (33 ft), operations shall cease and vessels shall reduce speed to the minimum level required to maintain steerage and safe working conditions. If human safety is at risk, the in-water activity will be allowed to continue until it is safe to stop.
- The Navy must establish shutdown zones for all for in-water pile driving activities. The purpose of a shutdown zone is generally to define an area within which shutdown of activity would occur upon sighting of a marine mammal (or in anticipation of an animal entering the defined area). Shutdown zones will vary based on the type of pile installation/removal activity (See Table 9). Here, shutdown zones are larger than the calculated Level A harassment isopleths shown in Table 7. The placement of lookouts during all pile driving activities (described in detail in the **Proposed Monitoring and Reporting** Section) will ensure that the entirety of all shutdown zones and Level A harassment zones are visible during pile installation and removal.

Table 9. Shutdown Zones During In-Water Pile Driving Activities

Activity	Pile Description	Distance (m)	
		PW	OW
Vibratory Installation / Removal	16-inch Timber Piles	15	15
	14-inch Steel H Beam	15	15
	24-inch Steel Sheet	15	15
Impact	16-inch Timber Piles	40	40

Installation / Removal	14-inch Steel H Beam	175	175

- The Navy must delay or shutdown all in-water pile driving activities should an animal approach or enter the appropriate shutdown zone. The Navy may resume in-water pile driving activities after one of the following conditions have been met: (1) the animal is observed exiting the shutdown zone; (2) the animal is thought to have exited the shutdown zone based on a determination of its course, speed, and movement relative to the pile driving location; or (3) the shutdown zone has been clear from any additional sightings for 15 minutes.
- The Navy shall employ lookouts trained in marine mammal identification and behaviors to monitor marine mammal presence in the action area. Requirements for numbers and locations of observers will be based on hammer type, pile material, and Seabees training location as described in Section 5 of the IHA. Lookouts must track marine mammals observed anywhere within their visual range relative to in-water construction activities, and estimate the amount of time a marine mammal spends within the Level A or Level B harassment zones while pile driving activities are underway. The Navy must monitor the project area, including the Level B harassment zones, to the maximum extent possible based on the required number of lookouts, required monitoring locations, and environmental conditions. For all pile driving and removal activities, at least one lookout must be used.
- The placement of the lookouts during all pile driving and removal activities must ensure that the entire applicable shutdown zones are visible during all in-water pile installation and removal. One observer must be placed in a position to implement shutdown/delay procedures, when applicable, by notifying the hammer operator of a need for a shutdown of pile driving or removal.

- Prior to the start of pile driving or removal, the shutdown zone(s) must be monitored for a minimum of 30 minutes to ensure that they are clear of marine mammals (*i.e.,* pre-clearance monitoring). Pile driving will only commence once observers have declared the shutdown zone(s) are clear of marine mammals. Monitoring must also take place for 30 minutes post-completion of pile driving;
- If in-water work ceases for more than 30 minutes, the Navy must conduct pre-clearance monitoring of both the Level B harassment zone and shutdown zone;
- Pre-start clearance monitoring must be conducted during periods of visibility sufficient for the lead lookout to determine that the shutdown zones indicated in Table 9 are clear of marine mammals. Pile driving may commence following 30 minutes of observation when the determination is made that the shutdown zones are clear of marine mammals;
- The Navy must use soft start techniques when impact pile driving. Soft start requires contractors to provide an initial set of three strikes at reduced energy, followed by a 30 second waiting period, then two subsequent reduced energy strike sets. A soft start must be implemented at the start of each day's impact pile driving and at any time following cessation of impact pile driving for a period of 30 minutes or longer. Soft starts will not be used for vibratory pile installation and removal. Lookouts shall begin observing for marine mammals 30 minutes before "soft start" or in-water pile installation or removal begins.
- For any marine mammal species for which take by Level B harassment has not been requested or authorized, in-water pile installation/removal will shut down immediately when the animals are sighted;
- If take by Level B harassment reaches the authorized limit for an authorized species, pile installation will be stopped as these species approach the Level B harassment zone to avoid additional take of them.

Based on our evaluation of the applicant's proposed measures, NMFS has preliminarily determined that the proposed mitigation measures provide the means of effecting the least practicable impact on the affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance.

Proposed Monitoring and Reporting

In order to issue an IHA for an activity, section 101(a)(5)(D) of the MMPA states that NMFS must set forth requirements pertaining to the monitoring and reporting of such taking. The MMPA implementing regulations at 50 CFR 216.104(a)(13) indicate that requests for authorizations must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present while conducting the activities. Effective reporting is critical both to compliance as well as ensuring that the most value is obtained from the required monitoring.

Monitoring and reporting requirements prescribed by NMFS should contribute to improved understanding of one or more of the following:

● Occurrence of marine mammal species or stocks in the area in which take is anticipated (*e.g.*, presence, abundance, distribution, density);

● Nature, scope, or context of likely marine mammal exposure to potential stressors/impacts (individual or cumulative, acute or chronic), through better understanding of: (1) action or environment (*e.g.*, source characterization, propagation, ambient noise); (2) affected species (*e.g.*, life history, dive patterns); (3) co-occurrence of marine mammal species with the action; or (4) biological or behavioral context of exposure (*e.g.*, age, calving or feeding areas);

- Individual marine mammal responses (behavioral or physiological) to acoustic stressors (acute, chronic, or cumulative), other stressors, or cumulative impacts from multiple stressors;
- How anticipated responses to stressors impact either: (1) long-term fitness and survival of individual marine mammals; or (2) populations, species, or stocks;
- Effects on marine mammal habitat (*e.g.*, marine mammal prey species, acoustic habitat, or other important physical components of marine mammal habitat); and,
- Mitigation and monitoring effectiveness.

Visual Monitoring

Monitoring must be conducted by qualified lookouts with support from Navy biologists, in accordance with the following:

- Navy biologists will train and certify lookouts in accordance with the mitigation, monitoring and reporting requirements of the issued IHA;
- NMFS will approve resumes of the Navy biologists who provide the training to the lookouts;
- Lead lookouts will be selected by Navy biologists among the best performing lookouts;
- All lookouts will maintain contact via either handheld communication devices or flags to signal sightings and shutdowns;
- Lookouts shall be placed at vantage points to monitor for marine mammals and implement shutdown/delay procedures when applicable by calling for the shutdown to the hammer operator;
- The Lead lookout will be located within auditory range of the pile driving team and will have primary responsibility for calling activity shutdowns;

- Lookouts shall use a hand-held GPS device, rangefinder or marker buoy to verify the required monitoring distance from the project site;
- Monitoring shall occur in all-weather until training has concluded for the day;
- Lookouts must scan the waters within the Level A harassment and Level B harassment zones using binoculars (10x42 or similar) and or the naked eye and make visual observations of marine mammals present; and
- Lookouts must record all observations of marine mammals as described in the Section 5 of the IHA, regardless of distance from the pile being driven. Lookouts shall document any behavioral reactions in concert with distance from piles being driven or removed;

Lookouts must have the following additional qualifications:

- Visual acuity in both eyes (correction is permissible) sufficient for discernment of moving targets at the water's surface with ability to estimate target size and distance; use of binoculars may be necessary to correctly identify the target;
- Sufficient training, orientation, or experience with the construction operation to provide for personal safety during observations;
- Writing skills sufficient to prepare a report of observations including but not limited to the number and species of marine mammals observed; dates and times when in-water construction activities were conducted; dates, times, and reason for implementation of mitigation (or why mitigation was not implemented when required); and marine mammal behavior; and
- Ability to communicate orally, by radio or in person, with project personnel to provide real-time information on marine mammals observed in the area as necessary.

Reporting

The Navy must submit a draft marine mammal monitoring report to NMFS within 90 days after the completion of pile driving training activities, or 60 days prior to a requested date of issuance of any future IHAs for projects at the same location, whichever comes first. NMFS would provide comments within 30 days after receiving the draft report, and the Navy would address the comments and submit revisions within 30 days of receipt. If no comments are received from NMFS within 30 days, the draft report would be considered as final.

The draft and final marine mammal monitoring reports must be submitted to *PR.ITP.MonitoringReports@noaa.gov* and *ITP.tyson.moore@noaa.gov*. The reports shall include an overall description of work completed, a narrative regarding marine mammal sightings, and associated data sheets. Specifically, the reports must include:

- Dates and times (begin and end) of all marine mammal monitoring;
- Construction activities occurring during each daily observation period, including the number and type of piles driven or removed and by what method (*i.e.*, impact or vibratory) and the total equipment duration for vibratory installation and removal for each pile or total number of strikes for each pile for impact driving;
- Lookout locations during marine mammal monitoring;
- Environmental conditions during monitoring periods (at beginning and end of lookout shift and whenever conditions change significantly), including Beaufort sea state and any other relevant weather conditions including cloud cover, fog, sun glare, and overall visibility to the horizon, and estimated observable distance;
- Description of any deviation from initial proposal in pile numbers, pile types, average driving times, etc.;
- Brief description of any impediments to obtaining reliable observations during training periods; and

- Description of any impediments to complying with the aforementioned mitigation measures.

Lookouts must record all incidents of marine mammal occurrence in the area in which take is anticipated regardless of distance from activity, and shall document any behavioral reactions in concert with distance from piles being driven or removed. Specifically, lookouts must record the following:

- Name of lookout who sighted the animal(s) and lookout location and activity at time of sighting;
- Time of sighting;
- Identification of the animal(s) (*e.g.*, genus/species, lowest possible taxonomic level, or unidentified), lookout confidence in identification, and the composition of the group if there is a mix of species;
- Distance and bearing of each marine mammal observed relative to the pile being driven for each sighting (if pile driving was occurring at time of sighting);
- Estimated number of animals (min/max/best estimate);
- Estimated number of animals by cohort (adults, juveniles, neonates, group composition, sex class, etc.);
- Animal's closest point of approach and estimated time spent within the harassment zone;
- Description of any marine mammal behavioral observations (*e.g.*, observed behaviors such as feeding or traveling), including an assessment of behavioral responses thought to have resulted from the activity (*e.g.*, no response or changes in behavioral state such as ceasing feeding, changing direction, flushing, or breaching);
- Number of marine mammals detected within the harassment zones and shutdown zones, by species; and

- Detailed information about any implementation of any mitigation triggered (*e.g.*, shutdowns and delays), a description of specific actions that ensued, and resulting changes in behavior of the animal(s), if any.

Reporting Injured or Dead Marine Mammals

In the event that personnel involved in the construction activities discover an injured or dead marine mammal, the IHA-holder must immediately cease the specified activities and report the incident to the Office of Protected Resources (OPR) (*PR.ITP.MonitoringReports@noaa.gov; itp.tysonmoore@noaa.gov*) and to the West Coast Regional Stranding Coordinator (1-866-767-6114) as soon as feasible. The incident report must include the following information:

- Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable);
- Species identification (if known) or description of the animal(s) involved;
- Condition of the animal(s) (including carcass condition if the animal is dead);
- Observed behaviors of the animal(s), if alive;
- If available, photographs or video footage of the animal(s); and
- General circumstances under which the animal was discovered.

If the death or injury was clearly caused by the specified activity, the Navy must immediately cease the specified activities until NMFS is able to review the circumstances of the incident and determine what, if any, additional measures are appropriate to ensure compliance with the terms of the proposed IHA. The Navy must not resume their activities until notified by NMFS that they can continue.

Negligible Impact Analysis and Determination

NMFS has defined negligible impact as an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival (50

CFR 216.103). A negligible impact finding is based on the lack of likely adverse effects on annual rates of recruitment or survival (*i.e.*, population-level effects). An estimate of the number of takes alone is not enough information on which to base an impact determination. In addition to considering estimates of the number of marine mammals that might be "taken" through harassment, NMFS considers other factors, such as the likely nature of any impacts or responses (*e.g.*, intensity, duration), the context of any impacts or responses (*e.g.*, critical reproductive time or location, foraging impacts affecting energetics), as well as effects on habitat, and the likely effectiveness of the mitigation. We also assess the number, intensity, and context of estimated takes by evaluating this information relative to population status. Consistent with the 1989 preamble for NMFS' implementing regulations (54 FR 40338; September 29, 1989), the impacts from other past and ongoing anthropogenic activities are incorporated into this analysis via their impacts on the baseline (*e.g.*, as reflected in the regulatory status of the species, population size and growth rate where known, ongoing sources of human-caused mortality, or ambient noise levels).

To avoid repetition, the discussion of our analysis applies to both California sea lions and harbor seals, given that the anticipated effects of this activity on these different marine mammal stocks are expected to be similar. There is little information about the nature or severity of the impacts, or the size, status, or structure of any of these species or stocks that would lead to a different analysis for this activity.

NMFS has identified key factors which may be employed to assess the level of analysis necessary to conclude whether potential impacts associated with a specified activity should be considered negligible. These include (but are not limited to) the type and magnitude of taking, the amount and importance of the available habitat for the species or stock that is affected, the duration of the anticipated effect to the species or stock, and the status of the species or stock.

NMFS does not anticipate that serious injury or mortality would occur as a result of the Navy's planned activity given the nature of the activity, even in the absence of required mitigation. Pile driving activities associated with the Navy's pile driving training exercises, as outlined previously, have the potential to disturb or displace marine mammals. Specifically, the specified activities may result in take, in the form of Level B harassment, incidental to underwater sounds generated from pile driving. Potential takes could occur if individuals are present in zones ensonified above the thresholds for Level B harassment, identified above, while activities are underway. Level A harassment is not anticipated or proposed to be authorized, as described in the **Estimated Take** section, given the construction method and the implementation of the planned mitigation measures, including soft start measures during impact pile driving and shutdown zones.

Vibratory and impact hammers will be the primary methods of installation. Vibratory pile driving produces lower SPLs than impact pile driving and will be the predominant construction method used during training (Table 1). The rise time of the sound produced by vibratory pile driving is slower, reducing the probability and severity of injury. Impact pile driving produces short, sharp pulses with higher peak levels and much sharper rise time to reach those peaks. When impact pile driving is used, implementation of soft start and shutdown zones will significantly reduce any possibility of injury. Given sufficient "notice" through use of soft starts (for impact driving), marine mammals are expected to move away from a sound source prior to it becoming potentially injurious. The Navy will use at least one lookout stationed strategically to increase detectability of marine mammals, enabling a high rate of success in implementation of shutdowns to avoid injury.

Exposures to elevated sound levels produced during pile driving and removal in NBVC may cause behavioral disturbance of some individuals, however behavioral responses of marine mammals are expected to be mild, short term, and temporary. The

Navy's proposed activities and associated impacts will occur within a limited, confined area of the stocks' range. The project area is concentrated within two wharfs and the Level B harassment zones would be truncated by land. Given that pile driving and removal would occur for only short durations (*i.e.,* 4 training sessions lasting up to 24 days each) on nonconsecutive days, any harassment occurring would be temporary. Pinnipeds swim, dive, mill, and haul out in and around Port Hueneme, but there is no data regarding the rate of turnover over time of different pinnipeds present in the proposed action are. Further there is no information regarding long-term pinniped presence patterns. Due to the nature of the proposed training exercise, we can presume that some individual harbor seals and California sea lions will be repeatedly taken. Repeated, sequential exposure to pile driving noise over a long duration could result in more severe impacts to individuals that could affect a population; however, the number of non-consecutive pile driving days for this project means that these types of impacts are not anticipated.

Effects on individuals that are taken by Level B harassment, as enumerated in the **Estimated Take** section, on the basis of reports in the literature as well as monitoring from other similar activities, will likely be limited to reactions such as increased swimming speeds, increased surfacing time, or decreased foraging (if such activity were occurring) (*e.g.*, Thorson and Reyff, 2006). Marine mammals within the Level B harassment zones may not show any visual cues they are disturbed by activities or they could become alert, avoid the area, leave the area, or display other mild responses that are not observable such as changes in vocalization patterns. Most likely, individuals will simply move away from the sound source and be temporarily displaced from the areas of pile driving, although even this reaction has been observed primarily only in association with impact pile driving. The pile driving activities analyzed here are similar to, or less impactful than, numerous other construction activities conducted in Southern California, which have taken place with no known long-term adverse consequences from behavioral harassment (*e.g.*, December 27, 2021, 86 FR 73257; October 31, 2022, 87 FR 65578). Level B harassment will be reduced to the level of least practicable adverse impact through use of mitigation measures described herein and, if sound produced by project activities is sufficiently disturbing, animals are likely to simply avoid the area while the activity is occurring. While both California sea lions and harbor seals have been observed in the NVBC, they are frequently observed along the nearshore waters of Southern California and have been observed hauling outside the mouth of Port Hueneme Harbor (Department of the Navy, 2019) suggesting they have available habitat outside of the NBVC to use while the proposed activity is occurring. While vibratory pile driving associated with the proposed project may produce sounds above ambient noise, the project site itself is located in an industrialized port, the entire ensonified area is within in the NBVC, and sounds produced by the proposed activities are anticipated to quickly become indistinguishable from other background noise in port as they attenuate to near ambient SPLs moving away from the project site. Therefore, we expect that animals disturbed by project sound would simply avoid the area and use more-preferred habitats.

Additionally, and as noted previously, some subset of the individuals that are behaviorally harassed could also simultaneously incur some small degree of TTS for a short duration of time. Because of the small degree anticipated, though, any TTS potentially incurred here would not be expected to adversely impact individual fitness, let alone annual rates of recruitment or survival.

More generally, there are no known calving or rookery grounds within the project area. Because the Navy's activities could occur during any season, takes may occur during important feeding times. However, the project area represents a small portion of available foraging habitat and impacts on marine mammal feeding for all species should be minimal.

The project also is not expected to have significant adverse effects on affected marine mammal habitat. The project activities would not modify existing marine mammal habitat for a significant amount of time. Impacts to the immediate substrate are anticipated, but these would be limited to minor, temporary suspension of sediments, which could impact water quality and visibility for a short amount of time but which would not be expected to have any effects on individual marine mammals. Any impacts on marine mammal prey that would occur during the Navy's planned activity would have, at most, short-term effects on foraging of individual marine mammals, and likely no effect on the populations of marine mammals as a whole. The activities may cause some fish to temporarily leave the area of disturbance, thus temporarily impacting marine mammal foraging opportunities in a limited portion of the foraging range. However, because of the short duration of the activities and the small area of the habitat that may be affected, the impacts to marine mammal habitat are not expected to cause significant or long-term negative consequences. Indirect effects on marine mammal prey during the construction are expected to be minor, and these effects are unlikely to cause substantial effects on marine mammals at the individual level, with no expected effect on annual rates of recruitment or survival. Overall, the area impacted by the project is very small compared to the available surrounding habitat, and does not include habitat of particular importance.

It is unlikely that minor noise effects in a small, localized area of habitat would have any effect on the stocks' annual rates of recruitment or survival. In combination, we believe that these factors, as well as the available body of evidence from other similar activities, demonstrate that the potential effects of the specified activities would have only minor, short-term effects on individuals. The specified activities are not expected to impact rates of recruitment or survival and would, therefore, not result in population-level impacts.

In summary and as described above, the following factors primarily support negligible impact determinations for the affected stocks of California sea lions and harbor seals that the impacts resulting from this activity are not expected to adversely affect any of the species or stocks through effects on annual rates of recruitment or survival:

- No serious injury or mortality is anticipated or proposed for authorization;
- Take by Level A harassment of California sea lions and harbor seals is not anticipated or proposed for authorization;
- The Navy would implement mitigation measures including soft-starts for impact pile driving and shutdown zones to minimize the numbers of marine mammals exposed to injurious levels of sound, and to ensure that take by Level A harassment does not occur.
- The anticipated incidents of Level B harassment consist of, at worst, temporary modifications in behavior or TTS that would not result in fitness impacts to individuals;
- The specified activity and ensonification area is very small relative to the overall habitat ranges of all species and does not include habitat areas of special significance (Biologically Important Areas or ESA-designated critical habitat);
- The intensity of anticipated takes by Level B harassment is relatively low for all stocks and would not be of a duration or intensity expected to result in impacts on reproduction or survival; and
- The presumed efficacy of the proposed mitigation measures in reducing the effects of the specified activity to the level of least practicable adverse impact.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the proposed monitoring and mitigation measures, NMFS preliminarily finds that the total marine mammal take from the proposed activity will have a negligible impact on all affected marine mammal species or stocks.

Unmitigable Adverse Impact Analysis and Determination

There are no relevant subsistence uses of the affected marine mammal stocks or species implicated by this action. Therefore, NMFS has determined that the total taking of affected species or stocks would not have an unmitigable adverse impact on the availability of such species or stocks for taking for subsistence purposes.

Endangered Species Act

Section 7(a)(2) of the Endangered Species Act of 1973 (ESA: 16 U.S.C. 1531 *et seq*.) requires that each Federal agency insure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat. To ensure ESA compliance for the issuance of IHAs, NMFS consults internally whenever we propose to authorize take for endangered or threatened species.

No incidental take of ESA-listed species is proposed for authorization or expected to result from this activity. Therefore, NMFS has determined that formal consultation under section 7 of the ESA is not required for this action.

Proposed Authorization

As a result of these preliminary determinations, NMFS proposes to issue an IHA to the Navy for conducting up to four pile driving training exercises at NBVC for a year after the date of issuance of the IHA, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated. A draft of the proposed IHA can be found at: *www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act*.

Request for Public Comments

We request comment on our analyses, the proposed authorization, and any other aspect of this notice of proposed IHA for the proposed action. We also request comment on the potential renewal of this proposed IHA as described in the paragraph below. Please include with your comments any supporting data or literature citations to help inform decisions on the request for this IHA or a subsequent renewal IHA.

On a case-by-case basis, NMFS may issue a one-time, 1 year renewal IHA following notice to the public providing an additional 15 days for public comments when (1) up to another year of identical or nearly identical activities as described in the **Description of Proposed Activities** section of this notice is planned or (2) the activities as described in the **Description of Proposed Activities** section of this notice would not be completed by the time the IHA expires and a renewal would allow for completion of the activities beyond that described in the *Dates and Duration* section of this notice, provided all of the following conditions are met:

- A request for renewal is received no later than 60 days prior to the needed renewal IHA effective date (recognizing that the renewal IHA expiration date cannot extend beyond one year from expiration of the initial IHA).

- The request for renewal must include the following:

(1) An explanation that the activities to be conducted under the requested renewal IHA are identical to the activities analyzed under the initial IHA, are a subset of the activities, or include changes so minor (*e.g.*, reduction in pile size) that the changes do not affect the previous analyses, mitigation and monitoring requirements, or take estimates (with the exception of reducing the type or amount of take).

(2) A preliminary monitoring report showing the results of the required monitoring to date and an explanation showing that the monitoring results do not indicate impacts of a scale or nature not previously analyzed or authorized.

Upon review of the request for renewal, the status of the affected species or stocks, and any other pertinent information, NMFS determines that there are no more than minor changes in the activities, the mitigation and monitoring measures will remain the same and appropriate, and the findings in the initial IHA remain valid.

Dated: March 9, 2023.

Kimberly Damon-Randall,

Director, Office of Protected Resources,

National Marine Fisheries Service.

[FR Doc. 2023-05242 Filed: 3/14/2023 8:45 am; Publication Date: 3/15/2023]